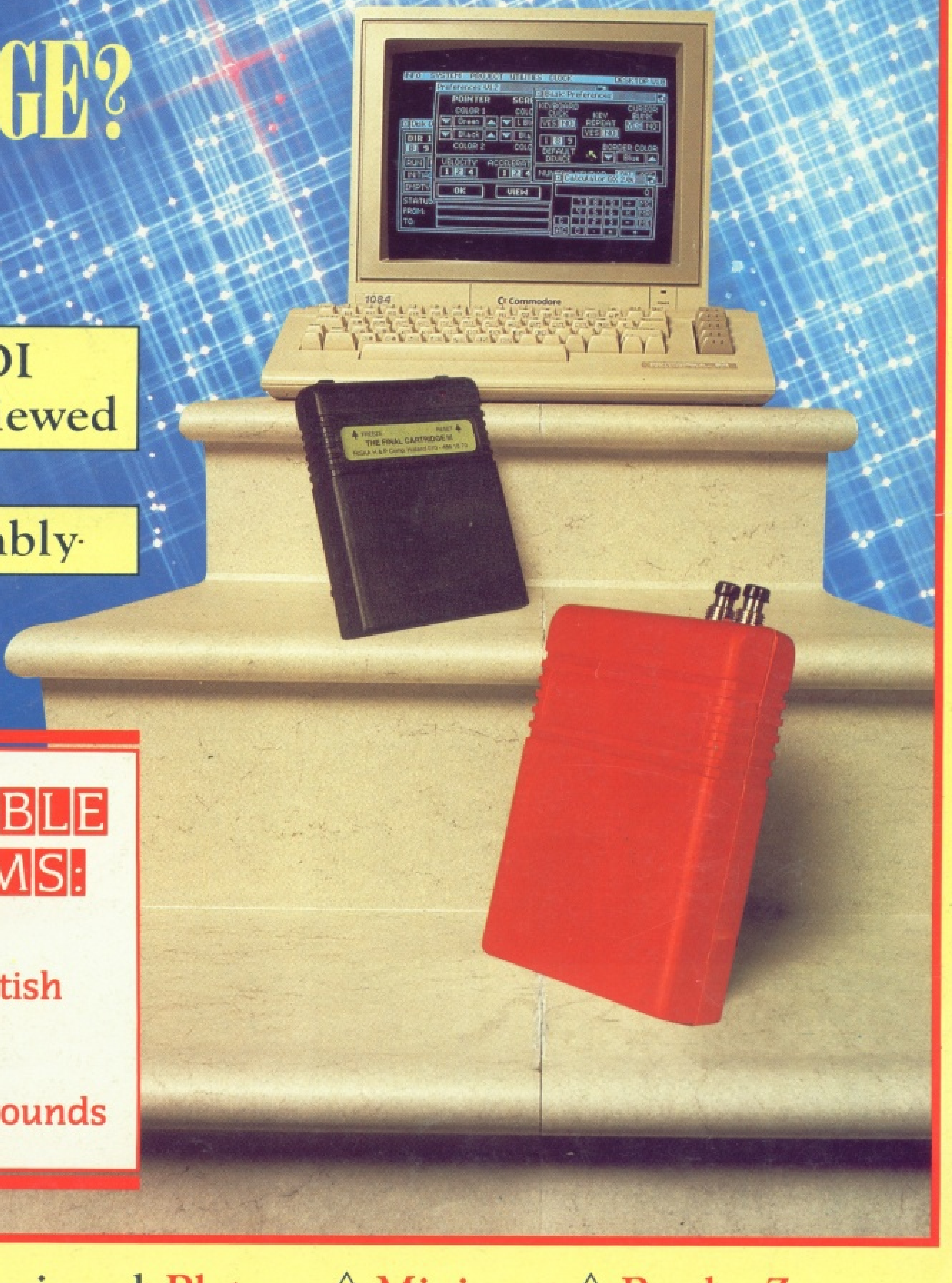
AN ARGUS SPECIALIST PUBLICATION

YOUR COMMODORE

APRIL 1988

£1.20

Will this be the FINAL CARTRIDGE?



Sonus MIDI Products Reviewed

CP/M Assembly

UNBEATABLE PROGRAMS:

Gyrospeed
Making GEOS British
Auto-Start
Tabulate Text
Extended Backgrounds

Latest Games Reviewed: Platoon △ Mini-putt △ Border Zone

OVER A DOZEN GOOD REASONS W

1 C64 CONNOISSEUR PACK
C64C, C2N, MOUSE AND CHEESE (PAINT/ART SOFTWARE), CLUEDO, MONOPOLY, SCRABBLE, CHESS, RENAISSANCE, TYPING TUTOR, PLUS 2 JOYSTICKS, 5 BOOKS, 10 BLANK DATA CASSETTES AND 10 PIECES OF EXTRA SOFTWARE. **£189.99▲**

2 128 COMPENDIUM PACK
COMMODORE 128, C2N, MUSIC MAKER, INTERNATIONAL SOCCER, JACK ATTACK, SPIRIT OF THE STONES, PLUS 2 JOYSTICKS AND ITB 1 AND 2. **£220.00▲**

3 PLUS 4 PRESENTATION PACK
PLUS 4, C2N DATASSETTE, 10 CASSETTE GAMES, 3 CARTRIDGE GAMES, SCRIPT PLUS WORDPROCESSOR, BUILT IN SPREADSHEET AND DATABASE, PLUS JOYSTICK. **£79.95▲**

4 COMPLETE MUSIC PACK
C64C COMPUTER, C2N DATASSETTE, 5 OCTAVE KEYBOARD, SOUND STUDIO CASSETTE, SOUND EXPANDER CASSETTE, PLUS 3 PLAYALONG ALBUM CASSETTES. A PROFESSIONAL SYNTHESISER IN YOUR OWN HOME. **£225.00▲**

5 MUSIC EXPANSION SYSTEM
FOR USE WITH C64, C64C, C128. INCLUDES 5 OCTAVE KEYBOARD, SOUND STUDIO CASSETTE, SOUND EXPANDER CASSETTE, 3 PLAYALONG ALBUMS CASSETTE OR DISC. PLAYALONG ALBUMS AVAILABLE SEPARATELY AT £5.99 EACH **£75.00▲**

MUSIC EXPANSION NOW AVAILABLE ON DISK. ALSO AVAILABLE COMMODORE SOUND SAMPLER DISK ONLY **£32.99▲**

6 SEIKOSHA PRINTER
COMPATIBLE WITH MOST MAKES OF COMMODORE COMPUTERS. FEATURES VARIETY OF FONTS INCLUDING GRAPHICS AND NEAR LETTER QUALITY, REVERSE PRINTING, ITALICS, TRACTOR FEED AND PAPER SEPARATOR. COMES COMPLETE WITH SERIAL CABLE AND FREE EASY SCRIPT WORD PROCESSOR PACKAGE. **£169.99▲**

7 COMMODORE 64C AND C2N DATASETTE
(DATASETTES ARE AVAILABLE SEPARATELY FOR ONLY £27.99) **£149.99▲**

8 COMMODORE 1901 COLOUR MONITOR
COMPATIBLE WITH MOST COMMODORE HOME COMPUTERS. HIGH QUALITY RESOLUTION AND SOUND. RGB AND PAL SWITCH. ALLOWS FOR 80 COLUMN MODE. **£275.00▲**





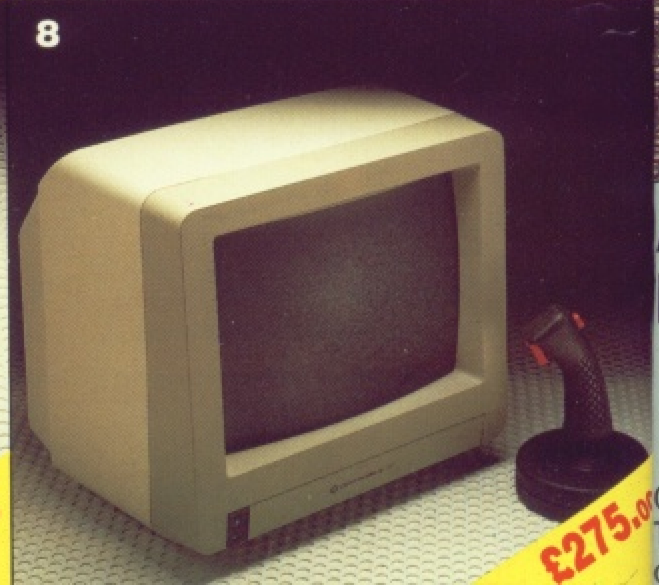














NEW
AM
£20
SO
AC
FO
FFER I
ACKEF



AM
MC
C
OFFER
THE VE
Offer ar

WHY YOU SHOULD READ THIS!







9 COMMODORE 1541c DISK DRIVE

THIS NEW STYLE 1541 DISK DRIVE COMES WITH 20 BLANK DISKS, LOCKABLE DISKETTE STORAGE BOX AND 5 PIECES OF DISK BASED SOFTWARE ALL INCLUDED IN THE OFFER. **£189.99▲**

10 EVESHAM EXCELERATOR PLUS DISK DRIVE

COMPATIBLE WITH COMMODORE HOME COMPUTERS COMES WITH 20 BLANK DISKS, LOCKABLE DISKETTE STORAGE BOX PLUS 5 PIECES OF DISK BASED SOFTWARE **£159.99▲**

11 AMIGA PRODUCTS

KUMANA EXTERNAL DISK DRIVE + 10 FREE DISKS	£159.00▲
AMIGA EXTERNAL DRIVE + 10 FREE DISKS	£195.00▲
AMIGA 512K RAM EXPANSION	£115.00▲
MPS 1200 PRINTER	£225.00▲
MPS 1500C COLOUR PRINTER	£345.00▲

▲ *TO ALL PRICES ADD £5.00 CARRIAGE NEXT DAY DELIVERY AVAILABLE £10.00 CASH/ CREDIT CARD ONLY.*

NEW OUTSTANDING AMIGA 500 OFFERS

AMIGA 500 WITH £200 OF **FREE** SOFTWARE AND ACCESSORIES FOR ONLY – **£450.00▲**

OFFER INCLUDES: AMIGA 500 COMPUTER, MOUSE, THE VERY FIRST TUTORIAL, DELUXE PAINT, HACKER II, SHANGHAI, MUSIC STUDIO, DISK STORAGE BOX, 10 BLANK DISKS, 2 JOYSTICKS





AMIGA 500 & 1081 COLOUR MONITOR

ONLY **£649.00▲**

OFFER INCLUDES: AMIGA 500, AMIGA 1081 COLOUR MONITOR, MOUSE, THE VERY FIRST TUTORIAL, DELUXE PAINT

Offer applies to U.K. Mainland only, All products guaranteed for 12 months.

Privileged Purchase Card

When you participate in this unique offer from Postronix, you will also receive a privileged purchaser card enabling you to add to you collection of Amiga software, accessories and hardware plus many other products available from Postronix, all at incredible discount prices.



postronix ltd

A Prestwich Holdings plc Company

SEND YOUR ORDER TO POSTRONIX LTD. 8 FARADAY COURT, PARK FARM, WELLINGBOROUGH, NORTHANTS NN8 3XY

REG NO:- 2019261

TITLE (TICK) MR. MRS. MISS INITIALS SURNAME

ADDRESS

POSTCODE

CUSTOMER NO (IF KNOWN)

Please send me

PLEASE DEBIT MY CREDIT CARD

SIGNATURE .... DATE ....

(OVERSEAS CARD HOLDERS PLEASE STATE EXPIRY DATE)

OR ENCLOSE CHEQUE/ POSTAL ORDER FOR £ CHEQUE PAYABLE TO POSTRONIX LTD

SEE NOTE

TOTAL GOODS

POSTAGE & PACKING

GRAND TOTAL

OR PHONE (0933) 677733 24 HOUR ORDER SERVICE

IF YOU DO NOT WISH TO ORDER BUT WOULD LIKE A FREE CATALOGUE, FILL IN THIS COUPON AND SEND TO ADDRESS SHOWN

▲ *TO ALL PRICES ADD £5.00 POST & PACKAGE OR £10 FOR NEXT DAY DELIVERY.*



Editor: Stuart Cooke
Deputy Editor:
Sue Joyce
Advertisement
Manager: Stuart Taylor
Advertisement Copy
Control: Laura
Champion
Origination: Ebony
Typesetting
Design: Argus Design
Studio

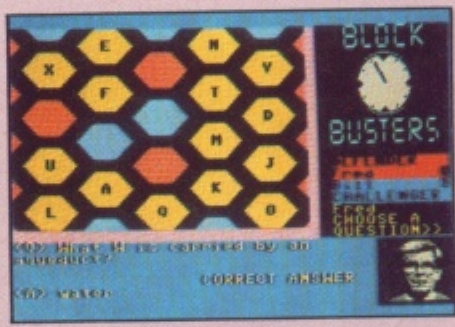
Your Commodore incorporating Your 64 is a monthly magazine appearing on the first Friday of each month. Your Amiga is published every second month within the pages of Your Commodore. Argus Specialist Publications Limited Editorial & Advertisement Office, Your Commodore, No 1 Golden Square, London W1R 3AB. Telephone: 01-437 0626 Telex: 8811896.
Subscription rates upon application to Your Commodore Subscriptions Department, Infonet Ltd, 5 River Park Estate, Berkhamsted, Herts, HP4 1HL.

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

REGULARS



Pub Games



Blockbusters

	C64	C16	C128	+4
Data Statements	●	●	●	●
Communications Corner	●	●	●	●
Competition	●		●	
Games Update	●		●	
Bothersome Basic				
Teacher's Pet	●	●	●	●
	●		●	
The ICPUG Column				
First Steps	●	●	●	●
	●	●	●	●
Making Music	●		●	
Software for Sale	●		●	
Listings	●			
Back Page	●	●	●	●

ARGUS PRESS GROUP

VOLUME 4
NUMBER 7

The contents of this publication including all articles, designs, drawings and programs and all copyright and other intellectual property rights therein belong to Argus Specialist Publications Limited. All rights conferred by the Law of Copyright and other intellectual property rights and by virtue of international copyright conventions are specifically reserved to Argus Specialist Publications Limited and any reproduction requires the prior written consent of the Company. © 1987. Distribution SM Distribution, 16-18 Trinity Gardens, London SW9 8DX. Printed by Chase Web, Plymouth. Opinions expressed in reviews are the opinions of the reviewers and not necessarily those of the magazine. While every effort is made to thoroughly check programs published for errors we cannot be held responsible for any errors that do occur.

ISSN
0269-8277

DATA STATEMENTS

Reverse Logic

To celebrate Australia's Bicentennial Year, the Aussie companies were out in force at the recent Which Computer? Show. Eskies and tinnies gave way to floppies and PCs on the Austrade stand.

Despite a loyal and vociferous readership for *Your Commodore* in the Antipodes, Commodore compatible peripherals and software were not in evidence. The Australian Trade Commission were eager to promote the fact that high technology is no stranger to the shores of Oz.

Coming from Down Under it's not surprising that one product from Software Solutions, the QCOM Corporate Retriever, is based on an inverted file technique!

The Communist T(h)reat

Mirrorsoft are agents to a Communist plot to take over your computer. The release of Tetris, the first computer game ever to be produced in Russia and marketed in the West, has caused quite a stir in the media, particularly in the USA.

At the recent launch members of Mirrorsoft, the Russian Embassy and America's CBS News mingled together in a glasnostian atmosphere at Virgin Games' Oxford Street store. Decadent Western standards ensured that copious quantities of champagne were to hand (well a bottle or two anyway) so that Tetris could be launched in the true spirit of technological exchange. A statement on the USA Government's desire to send in a team to verify software sales quotas has not yet been cleared for publication.

Tetris was invented by Alexei Paszitnov, 30, and the man who paszditon to Mirrorsoft was Victor Brjabrin, Head of the Computer Centre of the USSR Academy of Scientists.

The game was first spotted by Andromeda Software's Robert Stein at the Computer Research Laboratory in Budapest during a recent visit to Hungary. Impressed by the simple addictiveness of the game, Stein showed it to Mirrorsoft who immediately snapped up the publishing rights.

The game is an enhanced form of the original PC game programmed by Vagim Gerasimov of Moscow University. In addition to a high resoluton backdrop, the 25 minute musical accompaniment was programmed in by Hagar, a regular contributor to Compunet's growing bank of musical talent.

Touchline:

Mirrorsoft Ltd: *Athene House, 66-73 Shoe Lane, London EC4P 4AB.* ***Tel:*** *01-377 4645.*

Sticking to Wales

Konix, the Speed King joystick company, have moved from their original home in Tredegar, Gwent, to larger premises but they are still staying in Wales.

The new factory at Ebbw Vale was opened by the Rt Hon Secretary of State for Wales, Peter Walker, in the presence of the Rt Hon Michael Foot, MP for Blanau Gwent and civic leaders and dignitaries including the Mayor of Blanau Gwent.

Konix currently export 90% of their joysticks and have just signed an agreement with Kraft, one of the largest computer peripheral manufacturers in the US, for the distribution rights to their products in Europe.

The move to the larger premises will enable Konix to employ a further 100 people which is a welcome move for the people of South Wales.

At the opening, Peter Walker enthused, "I am delighted that this company with such high technology has conquered world markets, applying up to date technology coupled with an enthusiastic labour force. I'm sure the company will have enormous impact worldwide in years to come." Speaking on behalf of his constituency, Michael Foot added, "I'm thrilled to see what has happened here for Konix and feel sure the company has a wonderful future, which is good news for all of us."

Touchline:

Konix Products Ltd: *35 Rassau Industrial Estate, Ebbw Vale, Gwent NP3 5SD.* ***Tel:*** *0495 350101.*



Wynn Holloway (left), Konix chairman, explains the finer points of the Speed King to Peter Walker and Michael Foot

DATA STATEMENTS

Barrett's New Home

The vacancy at Commodore for a marketing manager, arising through the resignation of Amanda Cridge, has been filled by the appointment of Dean Barrett. Barrett was previously employed by PR consultants Burgess Daring Duncan on their Commodore account. Naturally this placed Barrett in an ideal position to move across to his new post.

Commodore's managing director, Steve Franklin, comments, "Dean has proved himself over the past six months, handling our account at BDD not just as a professional PR man but as a valuable member of my sales and marketing team. He knows the business, he knows our dealers and he knows our agencies. I am delighted to welcome him aboard."

Barrett will be responsible for developing dealer and end-user marketing support across both the consumer and the business divisions. He will also co-ordinate the activities of Commodore's agencies: Mills & Hughes (consumer product advertising), Shape (business products advertising) and his old company BDD (corporate and product public relations).

Touchline:

Commodore Business Machines UK Ltd: *Commodore House, The Switchback, Gardner Road, Maidenhead, Berks SL6 7XA.* ***Tel:*** *0628 770088.*

GEOS Basic

Working with standard GEOS is easy but programming can be a problem unless you use BeckerBASIC from Abacus.

This extension language adds over 270 new commands and functions to the C64 and GEOS, allowing programmers to use pull-down menus, dialogue boxes, various fonts, high resolution graphics and fill patterns. Special commands are included for screen and cursor control, sprite animation, sound and music development with structured programming aids.

A further enhancement is customising through user defined commands and function key defining.

Once the utilities have been tailored, they can be distributed to other users through a runtime facility. BeckerBASIC is compatible with C64 Basic and GEOS Version 1.3.

Video Nasties

Accodata have produced a trendy roller blind to combat ailments associated with protracted exposure to monitor screens.

The blind can be rolled away to facilitate cleaning of the screen but, when in position, it helps to keep the operator clean too!

It takes around 30,000 volts to form a Static produced by the screen, creates a colour image on the screen and this produces a positive electrostatic field. The human body is negatively charged so an attraction is set up (you can see this on a Saturday afternoon when the football results are on TV – dozens of humans stuck to the windows of TV rental shops).

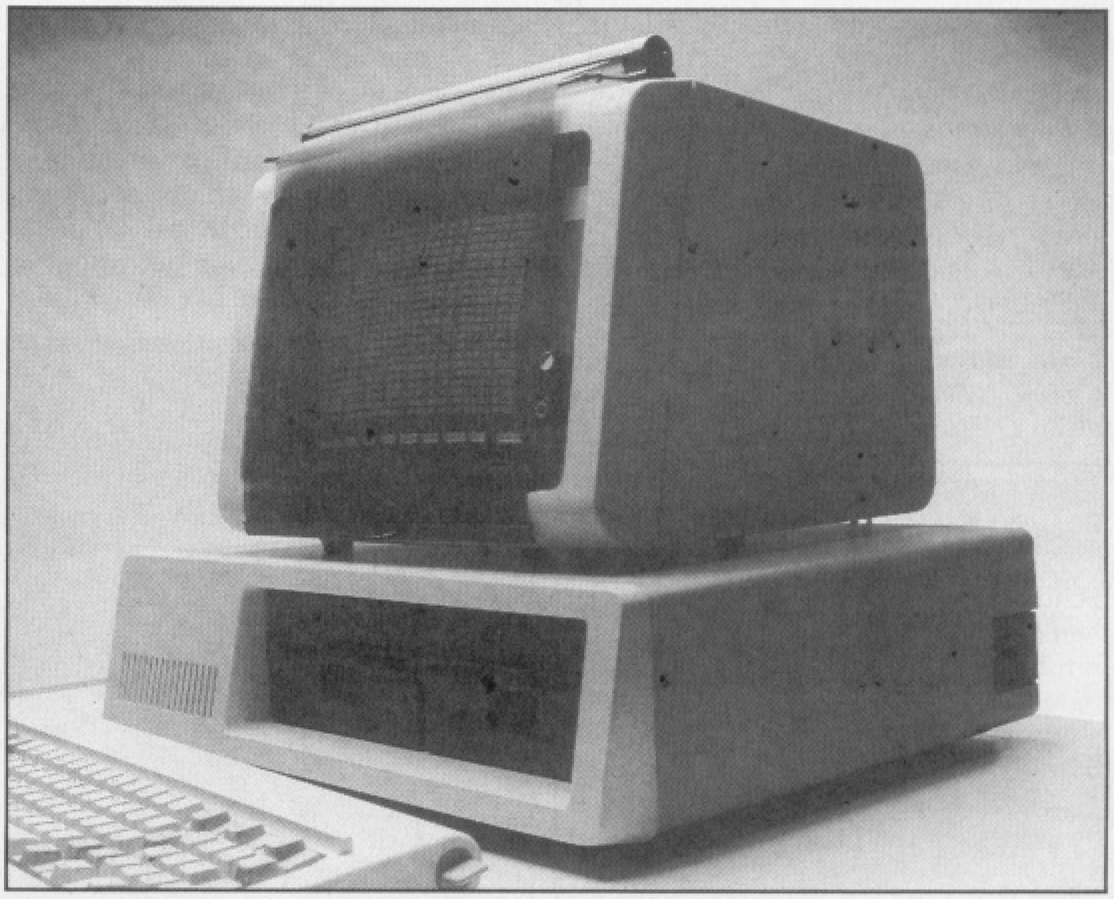
Carried along on this flow is all of the positively charged dust and grime, especially cigarette smoke, which is attracted to your negative charge.

To combat this effect the new screen filters are earthed to reduce the static present when the monitor is in use. Other problems are cured by the new filters such as headache-causing glare and harmful emissions are reduced by a metallised mesh.

The shock caused by static build-up is nothing compared to the shock caused by the price – £64.50 to £74.50!

Touchline:

Accodata: *Nepicar House, London Road, Wrotham Heath, Sevenoaks, Kent TN15 7RS.* ***Tel:*** *0732 885555.*



Accodata's smooth scroller

Tragic Loss

An accident has robbed Code Masters of a talented graphic artist and close friend. James Wilson, 20, was tragically drowned in an accident at Lyme Regis, Dorset, on Thursday, January 14th.

Wilson was a major contributor to the success of many Code Masters titles through his imaginative graphics. In a joint statement, the Darling brothers expressed their sorrow at the loss of their life long friend, "Not only was James a professional and innovative contributor to our company but, more importantly, he was a very special friend to all the family – we shall miss him tremendously."

Your Commodore would also like to express their deepest sympathy to James' family and all who knew him.

DATA STATEMENTS

Code Masters' Stimulator

"Over a hundred freelance programmers take a lot of organising", according to Code Masters' David Darling. With an increased output in 16 bit products for the Amiga and Atari ST alongside the new Code Masters Plus range, the need for a full time publisher's assistant has become essential and the Darling's didn't have to look far for someone to take on the task. Mark Baldock, programmer of Fruit Machine Simulator, has been given this demanding job.

Baldock has to listen to the problems and excuses of the commissioned programmers so his past experience should mean that he's well equipped to crack the whip or give encouragement when necessary.

Only one question remains; will the new blood in the Code Masters camp mean that they'll drop their habit of calling almost every game a something or other Simulator?

Touchline:

Code Masters: *1 Beaumont Business Centre, Beaumont close, Banbury, Oxon OX16 7RT.*

Protect the Innocent

School students as young as 11 are being encouraged to consider the implications of the widespread use of databases. British Trades Alphabet study cards have been distributed to schools and colleges throughout the United Kingdom to increase awareness of the Data Protection Act 1984.

In a statement on this latest move, Eric Howe, Data Protection Registrar, said recently, "It is important that young people are made aware of their rights under the Act. It is also useful if they are familiar with the legal obligations of computer users. With information technology playing an increasingly important role in our daily lives, it is inevitable that a large percentage of students will be working with computers during their careers and certainly their own personal data will end up in many data banks."

The release of over 30,000 of the studycards comes as a response to a growing number of enquiries for information on the Act from students and teachers up and down the country. The cards give a little information about the Act but their main purpose is to instigate discussions and create a questioning attitude towards the way in which databases can be used and the rights which an individual should have to gain access to files held about themselves.

Further information can be obtained from Nigel Waters, the Assistant Data Protection Registrar.

Touchline:

Office of Data Protection: *Springfield House, Water Lane, Wilmslow, Cheshire SK9 5AX.* ***Tel:*** *0625 535711.*

Colour Matrices

The competition between colour dot matrix printers is hotting up with the launch of machines from Star and Citizen.

The Star Multifont LC-10C has a built-in Commodore interface and allows a choice of seven colour, high density NLQ printing in one of eight fonts. The paper can be sheet fed or tractor driven by a push feed system which means easier label and standard form printing. Switching between tractor and sheet feeding is facilitated by a parking system which pulls the tractor paper out of the platten path but allows for automatic replacing after the sheet run is completed.

The new style Star front panel allows direct selecting of six of the special NLQ fonts as well as the normal linefeed, page feed, hex dump, self test and power up functions as well as the new paper parking facility.

The Citizen HQP-40 also employs high density NLQ facilities to support its optional seven colour printing capabilities. Only one font is supplied in the standard machine but this will be extended by the use of extra plug-in fonts giving a wide ranging capability for future developments.

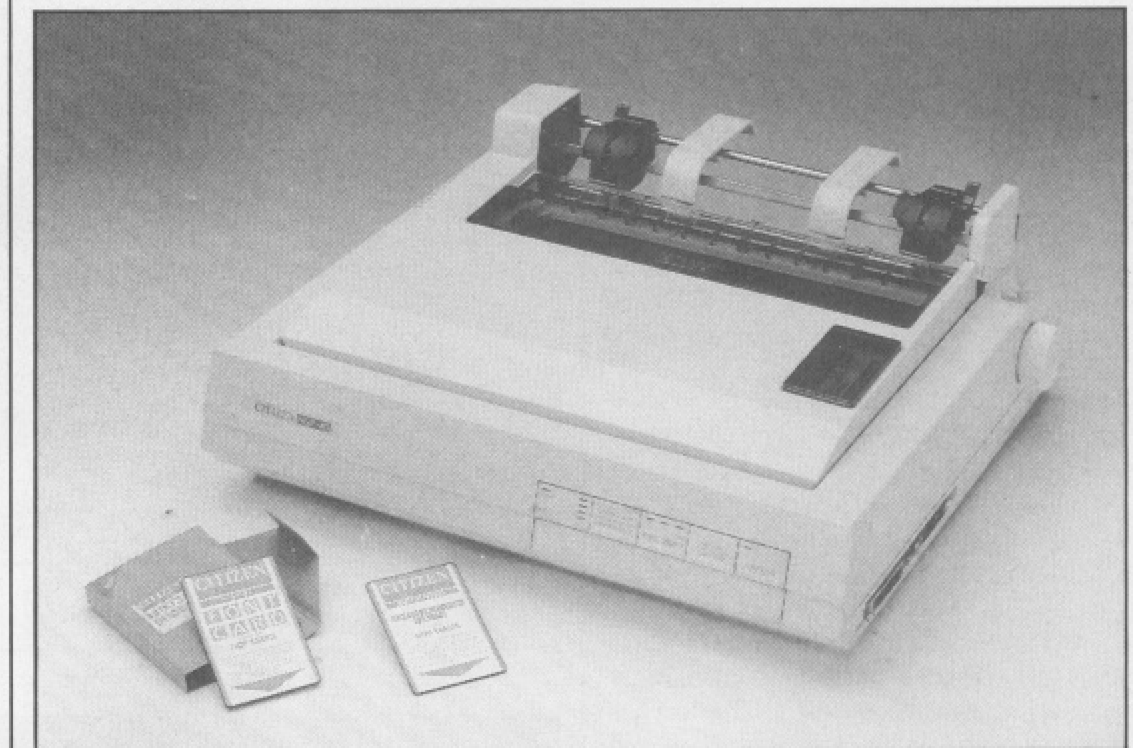
The basic printer costs £499, excluding VAT, and the add-on colour printing unit adds an extra £50 to this. There are no plans for a Commodore interface but a Centronics connection enables access through a suitable Commodore interface.

Both machines open up the possibilities of colourful graphs and pie charts as well as high resolution screen dumps through a suitable control program.

For those with more modest requirements, Epson's LQ500 lacks the colour facility but does provide font expansion through a series of cards for £385 plus VAT.

Touchline:

Star Micronics UK Ltd: *Craven House, 40 Uxbridge Road, Ealing, London W5 2BS.* ***Tel:*** *01-579 2259.*
Citizen Europe Ltd. Tel: *0895 72621.*
Epson (UK) Ltd: *Dorland House, 388 High Road, Wembley, Middlesex HA9 6UH.* ***Tel:*** *01-902 8892.*



Citizen HQP40 colour printer

DIMENSION computers l.t.d.

27/29 High Street
Leicester LE1 4FP
Tel: (0533) 517479/21874

THE MIDLAND'S LARGEST COMPUTER STORE

CBM 64/128 and PLUS 4 COMPANIES PACK
Sales/Purchase/Nominal Ledgers with Invoicing and Stock Control, Disc £24.95

PRECISION
Superscript 64 .... £24.95
Superbase 64/+4 .... £24.95
Superscript 64 & Superbase 64 .... £44.95
Superscript 128 .... £29.95
Superbase 128 .... £29.95
Superscript 128 & Superbase 128 .... £54.95
Superbase, The Book £11.95

GEOS Version 1.3
CBM 64/128 Operating System
Including: Desktop, Geowrite, Geopaint, and Desk Accessories, Disc
CBM64 .... £26.95
CBM128 .... £34.95

GEODEX/DESKPACK
Combined Database with powerful Mailmerge function. Also contains Artgrabber Graphic Images, Calendar and Icon Editor £21.95

GEOCALC
Geos-based Spreadsheet £24.95

GEOPUBLISH
Powerful Geos-based Desktop Publishing System allowing combined Text, Graphic Images and Line Graphics £34.95

I CONTROLLER*
Geos-compatible Joystick. Fits onto keyboard £12.95
*FREE OF CHARGE WITH PURCHASES OF TWO OR MORE GEOS PACKAGES

WRITERS WORKSHOP
Professional full-feature Wordprocessor. Integrates with Geopaint, etc. £21.95

THE NEW STAR LC10 Dot Matrix Printer
★ 120 cps Draft 30 cps NLQ ★ Friction and Tractor Feed
★ 5K Buffer ★ Paper Parking Facility
★ 6 Resident Fonts and 7 Different Print Pitches
Selectable from Front Mode Select Panel
Commodore Serial or Centronics £199.95
Including FREE GEOS worth £26.95

1541C DISC DRIVE £169.95
OCEANIC OC 118N £139.95
Commodore Compatible Disc Drive
Including GEOS, plus either:
Software Pack A
6 Disc Adventure Games plus 5 Disc Arcade Games
Software Pack B
Easyfile Database, and Future Finance Planning Package

CBM 64 Ram Expansion 256K £99.95
CBM 128 Ram Expansion 128K £99.95
CBM 128 Ram Expansion 512K £149.95

SUPER G
CBM to Centronics Printer Interface £34.95
FINAL CARTRIDGE 3 .... £39.95

COMMODORE 560P
2-colour Dot Matrix Printer, takes 2¼in. roll paper .... ~~£49.95~~ £29.95

MPS803 TRACTOR FEED UNIT £29.95

CBM 64/128 MUSIC EXPANSION SYSTEM
Including Keyboard, Synthesiser and Software £75.00

COMPOSER/EDITOR SOFTWARE
For Music Expansion System, Tape or Disc £24.95

ACTION REPLAY Mk IV
Tape to Disc Back-up Cartridge £29.95

NEOS MOUSE
WITH CHEESE SOFTWARE, Tape or Disc £24.95

COMMODORE C2N DATA RECORDER £29.95

PRINTER RIBBON OFFER
MPS 801, 802 Ribbons £5.95
MPS 803 & MPS 1000 .... £4.95
DPS 1101 Multi Strike £3.50
BUY FOUR AND GET ONE FREE!

AMIGA RANGE

AMIGA A500/CBM MONITOR OFFER
AMIGA A500 with **COMMODORE 1084 HIGH RES COLOUR MONITOR,**
Mouse, Workbench, Basic and DPAINT Software £679.00

AMIGA A500 PACK 1
with Mouse, Workbench, Basic, DPAINT, TV Modulator, 40 Disc Storage Box, Dust Cover, 10 Games/Utility Discs, plus Demolition, Space Battle and Cruncher Factory £458.85

AMIGA A500 PACK 3
with Mouse, Workbench, Basic, DPAINT, Demolition, Space Battle, and Cruncher Factory £429.95

PHILIPS 8833 COLOUR MONITOR
High Res with Stereo Sound Output £279.95

AMIGA A500
Upgrade to 1 Mb £113.00

AMIGA A500/8833 MONITOR OFFER
AMIGA A500 with **PHILIPS 8833 HIGH RES COLOUR MONITOR** with STEREO SOUND OUTPUT, Mouse, Workbench, Basic and DPAINT Software £699.95

COMMODORE 1084 HIGH RES MONITOR £329.95

AMIGA A500 PACK 2
with Mouse, Workbench, Basic, DPAINT, 40 Disc Storage Box, Dust Cover, 10 Games/Utility Discs, plus Demolition, Space Battle and Cruncher Factory £438.85

AMIGA 1Mb 2nd Drive £129.95
Including 10 3½" Discs

AMIGA A2000 COMPUTER with **COMMODORE 1084 HIGH RES COLOUR MONITOR**
Including 1 year on-site maintenance £1259.00

WRITERS WORKSHOP 128 .... £34.95
FONT PACK 1
Additional fonts for Geos £16.95
GEOFILE
Geos-based Database £24.95
GEOSPELL
Geos Spellchecker £16.95

NEW COMMODORE PRODUCTS
MPS1200P
Dot Matrix Printer £229.95
MPS1500C
7 Colour Dot Matrix Printer £349.95
Both include AMIGA Printer Lead
1581 3½" Disc Drive £199.95
Including 10 3½" Discs

HIGH PERFORMANCE 24 PIN Dot Matrix Printers
with Immaculate Letter Quality Mode
NEC 2200
★ 168 cps Draft, 56 cps LQ ★ Friction/Tractor Feed ★ 8K Buffer
★ 360 x 360 Graphic Resolution £379.00
AMSTRAD LQ3500
★ 135 cps Draft, 45 cps LQ ★ Friction/Tractor Feed
★ Over 100 Typeface Combinations £299.00
Both printers include AMIGA Printer Driver Software

CITIZEN 120D DOT MATRIX PRINTER
Commodore Version (with 64/128 Printer Lead) £159.95
Centronics Version (with AMIGA Printer Lead) £159.95
Commodore 1901 Colour Monitor £219.95
Philips 64/128 Green Screen Monitor £89.95
Commodore 1541C Disc Drive £159.95
Philips Colour TV Tuner
For use with any composite monitor including 1701, 1801, 1901 & 8833 .... £78.95

PERSONAL CALLERS AND EXPORT ENQUIRIES WELCOME
ALL OFFERS STRICTLY SUBJECT TO AVAILABILITY
ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE
ALL PRICES INCLUDE V.A.T. UNLESS OTHERWISE STATED

To order, either send cheque/P.O. with coupon or ring **(0533) 517479/21874** with Access/Barclaycard number. Please allow 7 working days for delivery from receipt of order or cheque clearance.
Please add £1.00 towards carriage and packing on any software order.
Hardware orders add £1.00 under £65.00 value, and £5.00 over £65.00 value.
Printer orders add £5.00 towards carriage.

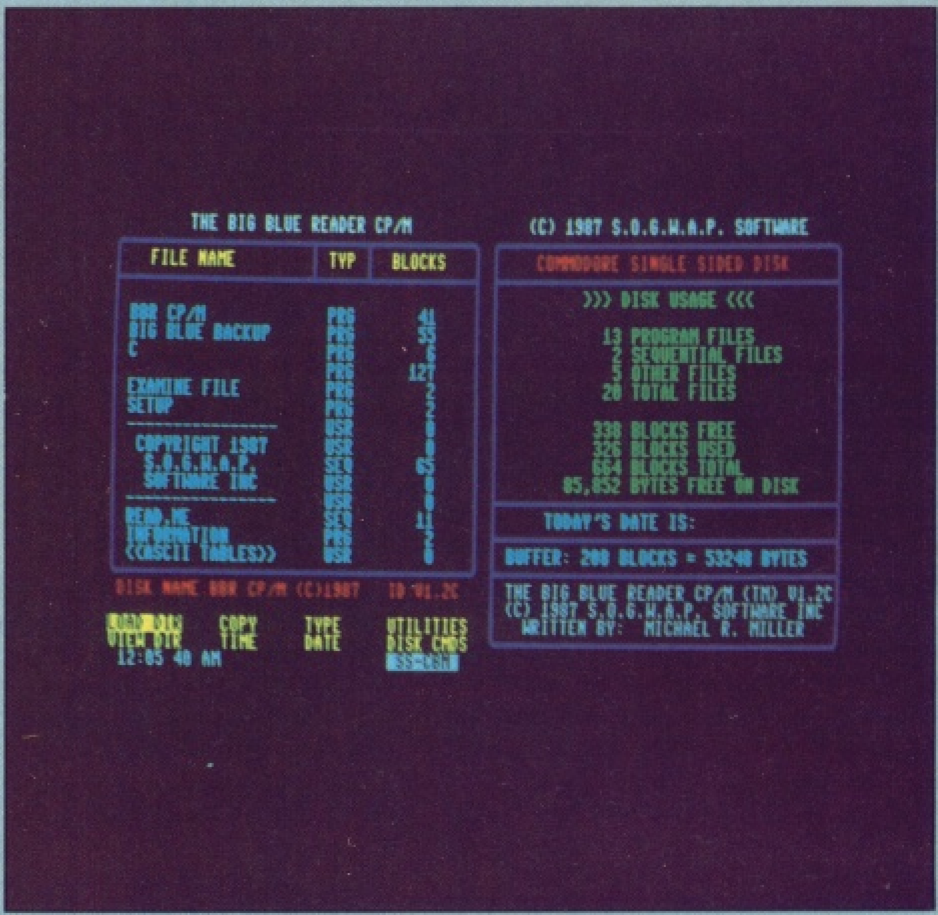
Send to: Dept. No. YC 4, Dimension Computers Ltd., 27/29 High Street, Leicester LE1 4FP.
Tel: (0533) 517479/21874 Fax: (0533) 511638

VISA

Item	Quantity	Price
	Total	

Name..........
Address..........
....
Telephone:..........

THE BIG BLUE READER



Big Blue's option screen

The 1571 disk drive can imitate CP/M drives but its versatility can be stretched even further

By Norman Doyle

As a journalist I'm often asked to supply articles on MS-DOS IBM format disks. This has meant using an IBM compatible running a wordprocessor which has different commands to the one that I normally use. Now, with the Big Blue Reader, I can do all my work on the C128D and create an MS-DOS disk using the integral 1571 drive and my customary wordprocessor.

The Big Blue Reader from SOGWAP Inc has been around for a couple of years but was not freely available in Britain. This early version had a few drawbacks with disks having to be pre-formatted using a separate program before the Reader was loaded and the program was unable to operate with CP/M program disks. The new CP/M version corrects these failings and adds a few extra improvements into the bargain.

The resultant program is a powerful aid to anyone who has to cross formats, allowing transfer of files between Commodore DOS, eight sector or nine sector MS-DOS and C128 CP/M diskettes in either single or double sided formats.

Full use is made of the C128's memory as a buffer to allow multiple

file transfers and disks can be formatted to Commodore or MS-DOS specifications without having to resort to secondary programs. Add to this the simple, user-friendly menu system and the result is a powerful program with many applications.

Commands are kept to just eight, allowing any facility to be called up at the touch of a function key or by highlighting one of the menu options using the cursor keys: Load Dir, Copy, Type, Utilities, View Dir, Time, Date and Disk Cmds.

Load Dir

Selection of this option is met with a secondary disk type menu – Commodore, MS-DOS or C128 CP/M. If the computer finds a correctly formatted disk in the drive the menu can be scrolled back and forth using the cursor keys.

This is a prepatory function which must be called before selecting either the Copy or Type options.

Copy

If a directory has been loaded into the program, any number of files can be selected for copying by using the cursor keys to scroll up or down and the RETURN key to make the choice. Selected files are indicated by a reversed asterisk beside the file name and mistakes can be corrected by reselecting any of these highlighted file names.

If all the files are to be copied the F1 key doubles as a 'select all' key and the F3 key will cancel all selections.

Before the transfer is made, the program asks which of the three formats is to be used for the target disk. If this means a cross over from say, Commodore to MS-DOS, the option to convert from Commodore ASCII to standard ASCII codes is offered.

Type

Any file can be displayed directly to the printer or screen but the results cannot be guaranteed. Sequential text files can be displayed without problems in standard or Commodore ASCII characters but program files can disrupt the running of the program.

Text files normally contain acceptable alphanumeric characters but when I tried Commodore program files the results were influenced by some of the codes contained. Colours changed, windows were formed and program crashes resulted.

There are two ways around this difficulty. The disk contains an examine file utility which can load a file for display via the C128's monitor. There is also a badly documented User Translation Table in the Utility option which should strip non-printable characters from displayed files but my attempts to use it proved fruitless.

Utilities

There are two utility functions held on the F7/8 key. The main one offers three options. The first I have just mentioned, the User Translation Table. The MS-DOS diskette formatter is essential and it's good to see it inside the program at last instead of as a separate file. Unfortunately, the newly added CP/M formatter is still a separate program.

The final option is a 1571 Speed-Up with disables the write verification which normally takes place when saving to a Commodore diskette. Although this gives about 30% faster saving times and is fairly reliable, there is the possibility of failure and it only applies to Commodore and CP/M transfers.

The second utility is a standard Commodore DOS allowing C128 disk commands to be easily issued to the drive.

Additional Keys

Before transferring a file it may be desirable to check what is already available. This could be done through the Disk Command option but a second, separate option is included which also allows the reading of directories from all disk formats.

Time and date options also exist which will label MS-DOS disks or simply give a temporary screen display.

Conclusions

As a 'one of a kind' program there is no yardstick by which to gauge the Big Blue Reader's performance. All that can be said is that it does its job admirably and with as little fuss as possible. The functions are basic and I got the feeling that the facilities have been stretched to eight options to comply with the number of function keys available.

The program is definitely for those who have a very specialised need such as my own or for those who are currently upgrading files to a newly acquired IBM compatible system.

Devised for a 1571 drive, the program will only run on a 128D in Britain which limits its availability to needy users. To those with access to a 128D or to the very rare 1571 stand-alone drives, this utility is an absolute boon and, knowing the capabilities of the excellent 1571, more conversion programs may become available from the States in the near future. YC

Touchline:
Name: *The Big Blue Reader.* ***Supplier:*** *Financial Systems Software, 2nd Floor, Anbrian House, St. Marys Street, Worcester WR1 1HA.* ***Tel:*** *0905 611463.* ***Machine:*** *C128 with 1571 drive.* ***Price:*** *£29.95.*

AT LAST! TAPE LOADING PROBLEMS NOW ELIMINATED WITH LOAD IT



- L.E.D. LIGHTS FOR ELECTRONIC TUNING
- PERMANENT ADJUSTING KNOB

ACHIEVES 100% LOADING SUCCESS EVEN ON THE MOST OBSTINATE TAPES

ONLY **£39.99** INC P & P

LOAD IT GIVES YOU:

★ 100% LOADING SUCCESS
★ PERMANENT HEAD ALIGNMENT ADJUSTMENT
★ L.E.D. LIGHTS FOR EASY TUNING TO OPTIMUM SIGNAL
★ GUARANTEED FOR ONE YEAR
★ APPROVED BY LEADING SOFTWARE HOUSES

ENQUIRIES TO:
MILLS ASSOCIATES LTD
WONASTOW ROAD
MONMOUTH
GWENT NPS 4YE
TEL: 0600 4611

Please send ___ LOAD-IT/S
NAME: ____________________
ADDRESS: ____________________
____________________ POSTCODE: ________
I enclose £_______ cheque incl. P&P made payable to MILLS ASSOCIATES LTD or debit my ACCESS/VISA card
Expiry date ____ No [| | | | | | | | | | | | | | |] YC

Access
VISA

Communications Corner

Is your hobby as costly as you think? Our intrepid reporter in the world of communications has been finding out

By David Janda

An area of comms that is rarely mentioned when buying comms equipment, be it modem, software or a subscription is the actual change to your telephone bill as a result of your new found hobby. On the one hand it would be unfair to expect the salesperson to give you an accurate estimate of how much you will be using their equipment or services, yet on the other hand some of the average figures I have heard quoted to potential customers are ludicrous!

There are three to four areas in which you will have to pay out such as purchasing equipment, cost of phone calls, subscription to on-line services (if applicable) and payment for value-added services (on-line charges etc.)

Before I describe each aspect, I would like to point out that one of the most common traps the comms newcomer falls into is of not budgeting for their hobby. Of course costs can be offset over a period of time, but you'll have to pay up in the end, so be prepared!

Purchasing Equipment

This covers the modem and software. The first payout can be the most crucial of them all. Purchasing a model will affect the time spent on-line, and the use of bad comms software will bog you down. There is nothing worse than flipping through dozens of menus while on-line and the telephone meter is ticking. As far as choosing a modem is concerned I would recommend that you purchase one of the more expensive models! Why? Because these provide higher baud rates such as 1200/75 and 1200/1200 full duplex even 2400/2400 full duplex such as the Pace Series Four 2400S (£499 + VAT). Higher baud rates means more data going down (and up) the phone line per second, and this will reduce the overall time spent on the telephone.

Comms software comes in many guises. The only advice that can be offered is to choose a package that you feel comfortable with. You can save money in the long run by purchasing software that provides some sort of data (or in the case of viewdata systems, frame) capture to disk or memory. This will enable you to read the captured material off-line thus saving you money.

It is also worth noting that the commercial services such as Micronet and Compunet offer subscribers various 'packages' which tend to include the modem, software and subscription all at a reduced rate, which are worth checking out.

One hidden hardware cost that may crop up is that of a telephone extension, or even a new line into your premises. Should you really get into comms the family may get annoyed with all your wires trailing across the living room floor and you may be banished to some corner of the house. A telephone extension may be in order, and here again you can save money by purchasing approved DIY telephone extension kits from reputable companies such as Dataphone Ltd for as little as £10. BT will organise it for a minimum of £28.75 + VAT for residential customers.

Should you use the phone frequently then you may have to opt for another line into your premises. The initial cost will be £105 + VAT. Then there is the cost of the phone (always buy your own – never rent one from BT), and the quarterly rental is £13.95 + VAT.

Cost of Phone Calls

This is the big one! I have met so many people, who, after some time have taken one look at the phone bill and have subsequently parked their modem in the attic for good! Without a doubt your phone bill will go up – be prepared for it to double or even triple. This may not be as bad as it sounds. An average quarterly phone bill of say £25 (ex. rental and VAT) going up to £60 may seem a lot, but is £60 such a big deal? Well, to some it is, so again it is best to be prepared. The telephone subscriber has two vital weapons of use in this ear against the BT phone bill a free booklet from BT and phone directory!

The cost of a call is measured in metered units. One unit costs 4.4p + VAT totalling 5.06p – remember this figure, it is vital! Depending on what time of day you call, and what distance that call is at you will be allowed a fixed amount of time for each unit. There is a simple formula to remember:

Number of units x 5.06p = cost of call

As an example, I live in north London and wish to make a call to Basildon, Essex at 9pm on a weekday.

The call will be cheap rate (mon-Fri 6pm-8am remember?). Next I need to know what charge band Basildon falls in, so looking at my A – D telephone directory I see that the charge band letter is 'a'. A cheap rate call in charge band 'a' will give me 100 seconds per metered unit. I make and time the call which lasts 423 seconds and divide this by 100 which gives me 4.23. Aha! We have come across a fraction, but all calls are rounded *up* to the nearest unit so I get a figure of 5. This is the number of metered units used for the call. Using the formula mentioned earlier:

5 x 5.06p = 25.3p the cost of the call

Each and every call that I make is calculated in this way. After a while it becomes second nature. The total cost of the call is written down (rounded up to the nearest penny) and at the end of the day a total is made which I enter into a book. At the end of a week the daily totals are added up and an appropriate number of telephone stamps are purchased. When the next BT bill arrives you simply pay at the local Post Office.

The calculating, and noting down of totals is an application begging to be computerised.

Subscriptions

Subscribing to services such as Micronet, Compunet or Microlink is going to cost you money. The vast majority of services have a quarterly subscription and nearly all require you to subscribe for a minimum of one year.

Value Added Services

This is another of those costs which most often than not is not budgeted for. Under this heading can come time charges, cost of downloading telesoftware, playing an on-line adventure game, entering a prize draw, or time charges for reading pages of information. These can mount up, and are very hard to keep track of. Compunet provide their customers with a detailed invoice itemising every transaction made on the system together with reference number, description, cost, date and VAT. Hats off to Compunet!

Prestel/Micronet on the other hand are terrible in this department. Bills are not itemised and there is no way in which you can verify costs by looking at the bill. It's a bit like receiving a bill in a restaurant which has just one heading – food x pounds please.

An example of where things can get out of hand is when playing Shades, Micronet's on-line adventure game. This, like many other on-line adventure games is very addictive, and players spend a lot of time and money on it. The game is time charged, yet players can only check the total cost of the current session on-line, and even this does not include VAT. To make matters worse, areas on Micronet such as Xtra the on-line magazine are time charged for non-Micronet subscribers, yet the time charge is included in the current total for the on-line session (which is subsequently taken off when the bill is calculated). This makes a mockery of the on-line total, and in all the billing system employed by Prestel is, to put it mildly, puzzeling.

By careful use of on-line systems, and by calculating the cost of phone calls a lot of money can be saved. It has not been my intention to 'scare off' potential, or existing modem users, but to highlight some of the cost which in the end, you and I have to pay. YC

LIFESAVERS 8	C64	LIST PAUSE	1/1

The C64 is sadly lacking a pause function that allows you to stop the listing of any program by pressing a certain key.
This routine changes the LIST vectors to point to a new routine. This routine will then check whether a SHIFT, COMMODORE or CTRL key has been hit. If so the routine will loop around until the key is released, thus stopping the listing.
Once the key is released the LIST will continue as normal.
A convienient way of stopping the listing for some time is to press the SHIFT LOCK key.

By G. Saunders

```
10 REM *****************
20 REM     LIST PAUSE
30 REM *****************
40 BL=1:LN=110:SA=49152
50 FOR L=0 TO BL:CX=0:FOR D=0 T
O 15:READ A:CX=CX+A:POKE SA+L*1
6+D,A:NEXT D
60 READ A:IF A><CX THENPRINT"ER
ROR IN LINE";LN+(L*10):STOP
70 NEXT L:END
80 DATA 162,11,160,192,142,6,3,
140,7,3,96,72,138,72,152,72,142
8
90 DATA 174,141,2,224,1,176,249
,104,168,104,170,104,76,26,167,
0,1886
100 SYS 49152: REM START PROG
```

commodore

AMIGA — FROM £425!

Amiga A500 with 512K RAM, 880K 3.5" disk, mouse, software	£425
Amiga A500 TV As above, plus A521 TV/composite modulator	£445
Amiga A500M with A1081 high-res colour monitor	£675
Amiga B2000 with 1MB RAM, 880K 3.5" disk, mouse, software	£999
Amiga B2000M As above, plus A1081 hi-res colour monitor	£1245
Amiga B2000 XTM As above, plus PC XT bridge board & floppy	£1745

Add £50 for A1084 in place of A1081. Prices include 15% VAT, a FREE copy of DeLuxe Paint, FREE delivery to your door, one year warranty. Overnight delivery £12 On-site maintenance option available.

PERIPHERALS AMIGA

A521 TV/composite modulator	£25
512K plug-in RAM/clock (A500)	£99
A1081 high-res colour monitor	£275
A1084 high-res colour monitor	£325
A1010 3.5" external disk drive	£185
Cumana 3.5" external disk drive	£129
NEC internal drive (2000 only)	£129
A2010 internal drive (2000 only)	£175
Genlock B2000 video controller	£225
A2052 2MB internal RAM card	£375
A2088 PC-XT bridge board with 5.25" internal disk drive	£499
A2286 PC-AT bridge board with 5.25" internal disk drive	£699
A2092PC 20MB internal hard disk with MS DOS controller	£525
A2092A 20MB internal hard disk with Amiga DOS controller	£625
A2094A 40MB Amiga Dos hard disk	Call
Supra hard disks 20MB - 250MB	Call
Citizen 120D 120 cps, F/T, NLQ	£185
Star LC10 120 cps, F/T, NLQ	£225
Precision printer 480 cps, NLQ	£399
Canon PJ1080A colour, 80 dpi	£499
Xerox 4020 colour, 240 dpi	£1125
HP LaserJet laser, 300 dpi	£1995

CREATIVITY AMIGA

De Luxe Paint II (PAL)		£59.95
DigiPaint 4096 colours		39.95
De Luxe Music (PAL)		59.95
Page Setter		94.95
City Desk		89.95
Animator Apprentice		179.95
ProWrite	Wordprocessing fully integrated with graphics	89.95
VizaWrite Desktop	High performance desktop publishing wordprocessor	79.95
Word Perfect	Amiga version of the No.1 best selling wordprocessor	199.95
The Works	Analyze + Organize + Scribble, integrated desktop	139.95
Publisher Plus	Enhanced version of the original desktop publisher	99.95
Flow	The Idea Processor from New Horizons Software	69.95
PixMate	Professional image enhancement straight from NASA!	44.95
Prism Plus	4096 HAM colour paint pack 1024 x 1024 (needs 1MB)	54.95
Calligrapher	Professional font editor, fonts up to 160 x 256 pixels	74.95
De Luxe Video II	Create all types of video presentations with ease	59.95
Aegis VideoScape	Full 3D animations in all resolutions with overscan	124.95
Pro-Video CGI	Professional video titler with fonts, extra fonts available	159.95
Aegis Animator	Full storyboarding package, includes Aegis Images	94.95
TV Show	PAL Image presentation in IFF or HAM with overscan	89.95
DigiPic	Fast frame-grabber, 32 colours or grey scale	299.95
Art of Chess	The best Amiga chess yet, packed with features	24.95

PRODUCTIVITY AMIGA

SAM Basic		£89.95
A/C Basic		154.95
A/C Fortran		229.95
Lattice C 4.0		144.95
Lattice C Professional		299.95
MCC Pascal		69.95
64 Emulator	Use your C64 programs and files! Includes cable	69.95
SuperBase Personal	Relational database power, without programming!	79.95
SuperBase Professional	With Forms Editor and DML program language	194.95
Acquisition (V1.3)	Relational database with programming language	224.95
Maxiplan 500	Ultimate Amiga spreadsheet, + text/graphics/speech	89.95
Maxiplan Plus	As Maxiplan 500 above, plus powerful Macro language	129.95
VIP Professional	1-2-3 compatible spreadsheet + database & graphs	99.95
Logistix	2048 x 1024 spreadsheet, database, graphs & calendar	99.95
Businessware Pack 1	Invoicing, Sales Ledger, Stock Control, by Panmead	159.95
Businessware Pack 2	General Ledger, Purchase Ledger, by Panmead	159.95
Intro Cad	Entry level CAD package, printer or plotter output	54.95
Aegis Draw Plus	Comprehensive CAD with multiple layers & windows	124.95
X-Cad	Professional CAD system (needs 2MB)	424.95
MCC Assembler	Professional development system with linker & libraries	59.95

128

Commodore 128D		£399
Commodore 128		199
NEW 1581 disk drive 3.5"		199
Commodore 1571 disk drive		199
Commodore 1541C disk drive		169
NEW Commodore PC-III		Call
VizaWrite 128 Classic		59.95
VizaWrite 64 (disk)		39.95
VizaWrite 64 (cartridge)		49.95
VizaStar 128		79.95
VizaStar 64 XL8		59.95
VizaStar 64 XL4		49.95
SuperBase 128		£29.95
SuperBase 64 & Plus/4		24.95
SuperBase: The Book		11.95
SuperBase Starter 64		14.95
SuperScript 128		29.95
SuperScript 64		24.95
PetSpeed	Oxford Systems' best selling Basic compiler (state 64/128)	19.95
Oxford Pascal	Complete J & W Pascal, with extensions (state 64/128)	19.95
Oxford Pascal 64 (tape)	As above, for C64 tape users	19.95
Cobol	Complete COBOL package from Abacus (state 64/128)	29.95
Super C	Complete C language to K & R standard (state 64/128)	39.95
Hack Pack	All-in-one programmer's Toolkit/Ram-disk (state 64/128)	19.95
Oxford Basic 64	All-in-one Basic compiler, Toolkit, compressor	19.95
1750 Expansion RAM	512K Expansion RAM cartridge for the C128	149.95
RamDos 128	Lightning-fast RAM-disk for 512K expansion RAM	29.95
1764 Expansion RAM	256K Expansion RAM cartridge for the C64	99.95
Anatomy of the 128	The 500-page insider's guide to the 128	9.95

IF YOU WANT IT TOMORROW... CALL US TODAY! ON 0483 - 504125

Prices are POST FREE & include VAT. Order by phone with your credit card, or send cheque/PO or your credit card number. Official orders welcome. We despatch same day by FIRST CLASS post. Please allow 5 days for delivery of hardware orders. Prices quoted are subject to availability. Ref. A58

VISA

Calco Software

LAKESIDE HOUSE, KINGSTON HILL, SURREY, KT2 7QT. TEL 01-546-7256

3 1/2"/128 SPECIALIST

1571/1541 Drive Alignment Package.

1571/1541 Drive Alignment reports the alignment condition of the disk drive as you perform adjustments. On screen help is available while the program is running. Includes features for speed adjustment and stop adjustment. Allows you to test each full and half track as yiu re-align the drive. Complete instruction manual on aligning both 1571 and 1541 drives. Even includes instruction on how to load the alignment program when nothing else will load!

Works on the 128, 128D, C64, SX64 in 128 mode or 64 mode.
Price Only £24.95

BASIC 8.

We are proud to introduce Basic 8 with Basic 8 with Basic Paint, the first C128 Software package specifically designed to unleash the hidden graphics power of your 128. Using a special wedge technique, Basic 8 achieves performance rivaling that of 16 bit micros! Imagine your 128 producing a resolution of 640 x 200 in mono and 640 x 192 in 16 colours without any additional hardware!

Basic 8 adds over 50 Hi-Res graphic commands to Basic 7.0 and is completely compatible with it's advanced non-graphic commands. You work in true 3-Dimensional environment, controlling such parameters as perspective viewing angles and the origin & depth of the view, many, many more features, available for only **£34.95**. Detailed information available on request.

1571 FIX ROM

Are you experiencing any of the following problems:-

- ⋆ I/O Error 5 when using Superbase?
- ⋆ Device Not Present errors?
- ⋆ Major problems when 2 or more files open?
- ⋆ Slow writing to second side of disk?
- ⋆ Takes for ever to recognize a flippy disk?

If you have one or more of these problems then you need 1571 FIX ROM, just plugs in. **Only £24.95**

The Big Blue Reader CP/M.

New from SOGWAP Software Inc., The Big Blue Reader allows you to transfer files generated on most IBM-Compatible (MS-DOS) software to all three modes of the Commodore 128 and vice versa. Thus, files can be transferred to or from MS-DOS, GCR (128 or 64) and CP/M disk formats. The Big Blue Reader requires a 1571 on both the Commodore 128 and 64. The Big Blue Reader only **£29.95**.

New 31/2 Disk Drives.

The new Commodore 1581 1 megabyte disk drive is now available. The NEW 1 1/2" disk drive is compatible with all Commodore computers from the 128 to the 64. This drive has been designed for serious and professional users it offers 3,160 blocks free, 8,000 bytes per second (31 blocks) loading rate. Software for this drive includes CADPAK, CHARTPAK, Oxford Pascal, Hackpack, Petspeed, GEOS. etc. Using the CANNON or Super 81 Utilities most software can simply be copied to the 3 1/2" disks. The drive is available for only **£199.95**

1351 MOUSE.

The 100% proportional compatible Commodore Mouse, works with GEOS 64/128, CADPAK and most drawing packages. **Only £29.95**

Software

CAD PAK 128 Draw Circuitry, House Plans, Precision Drawings	**£29.95**
Chart Pack 128 Produce Pie, Bar and Line Graphs, Load Save Data	**£34.95**
HackPack 128 Program Compressor, RAM-DISK and Toolkit	**£19.95**
Super C Full C Compiler, with Editor and Module Linker	**£39.95**
Xref 128 Cross Reference Variables, Line Numbers, Cmds	**£12.95**
Pascal 128 Full Pascal Compiler by Oxford Systems Software	**£19.95**
Gobol 128 Includes Syntax Checker, Editor and Compiler	**£29.95**
Disk Librarian catalogue upto 1,000 disks, Print Dir Lists etc	**£29.95**
The Great War Full World War 1, Hi-Res, Strategy Game.	**£14.95**

Financial Systems Software Ltd.

2nd Floor, Anbrian House, St Mary's street, Worcester, WR1 1HA. Telephone (0905) 611563

All prices include VAT and P&P.

Foreign Orders add £2.50 per package.

The Action Replay MK IV Could be Yours

Win this month's competition and you could be flying high with the Action Replay MK IV cartridge from Datel





Well, you've read about them, seen pictures of them and now, here's your chance to win one of Datel's Action Replay MK IV cartridges. The first ten correct entries pulled out of the hat will become proud owners of this sought after cartridge. So send your entry in now!

How to Enter

Study the two cartoons on this page; there are a number of differences between them. Once you have decided how many differences there are, complete the entry coupon and send it to the editorial address (see coupon). Write the number of differences that you have found on the back of the envelope. If you don't your entry will not be accepted.

The Rules

Entries will not be accepted from employees of Argus Specialist Publications and Datel Electronics. This restriction also applies to employees' families and agents of the companies.

The How to Enter section forms part of the rules. The Editor's decision is final and no correspondence will be entered into.

Action Replay MK IV Entry Coupon

Name ....

Address ....

.... Postcode ....

Number of differences found ....

If I win I would like the format of my copy of Action Replay MK IV to be:

Commodore 64 tape ....

Commodore 64 disk ....

Amiga disk ....

(please tick as appropriate)

Post to: Your Commodore,
Action Replay MK IV Competition,
1 Golden Square,
London W1R 3AB.

Preview The Future!

PROJECT: STEALTH FIGHTER



Stealth Fighter... the hottest topic of conversation in aviation circles today. Space Age technology and engineering make these aircraft virtually undetectable by enemy radar. Stealth Fighters are believed to be in operation, flying the most sensitive missions, flown by a superior class of pilot. You can experience that thrill of flying a revolutionary aircraft, previewing the edge of the future.

PROJECT: STEALTH FIGHTER. Another brillant simulation from MicroProse. Available for the Commodore 64/128K. Cassette £14.95. Disk £19.95.

MICRO PROSE
SIMULATION • SOFTWARE

Please send ________ copy/ies of Project: Stealth Fighter CBM 64/128 ☐ Cassette £14.95 ☐ Disk £19.95 ☐ Further details.

Name (block capitals)________________________ Address________________________

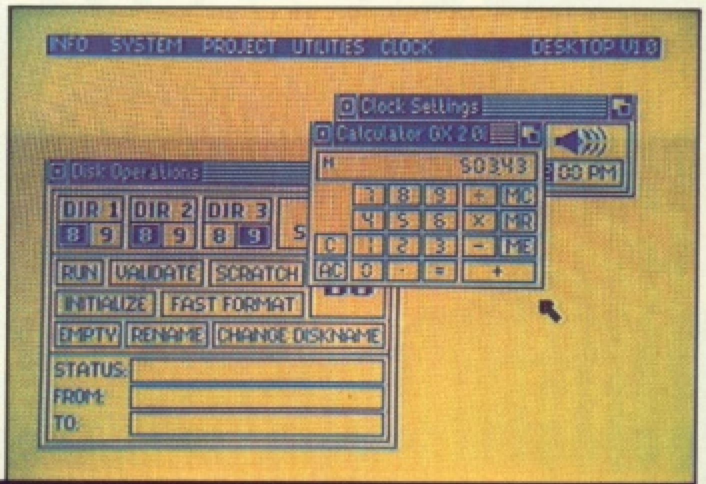
________________________ Post Code________________________

I enclose £____________ including 55p P+P. Cheques payable to MicroProse Software Ltd.

or debit my Access/Visa card. Expiry date____________ No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

MicroProse Ltd., 2 Market Place, Tetbury, Gloucestershire GL8 8DA. UK. Tel: (0666) 54326. Tlx: 43422 MPS/UKG.

ULTIMATE CARTRIDGES?

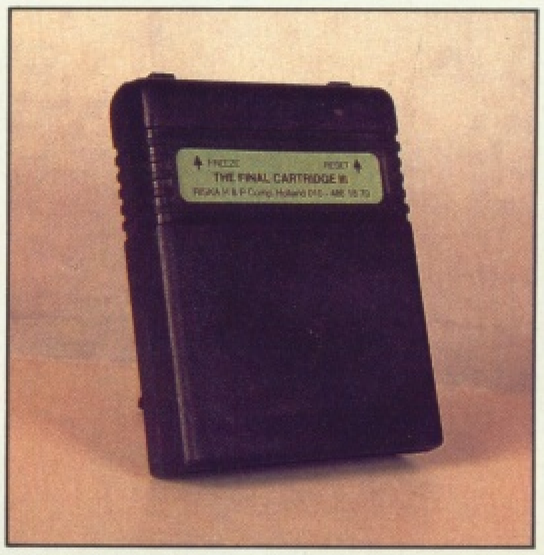


Are the latest cartridges on the market the ultimate in C64 add-ons?

By Stuart Cooke

*E*ven though the C64 has always had a cartridge port, it is only over the last couple of years that the cartridge market has been getting the attention that it deserves. Unfortunately, for the software industry, many of the cartridges developed were designed to enable the user to copy commercial programs.

As time has marched on, more and more cartridges have been developed, each offering more facilities than the last. Now Datel has added two more cartridges to the ranks of ever ready programs in the guise of the Final Cartridge III and the Action Replay MK IV. Both of these cartridges offer their owner facilities for making copies of commercial software. However, both offer the user of these cartridges many more features, making them stand out from others in the market.



Final Cartridge ▲

Action Replay MK IV ▼



To Copy Or Not To Copy

Even though many cartridges offer 'backup' facilities we must stress that *Your Commodore* does not condone the copying of software for purposes other than the owners own use. We do understand the importance of having backups of much used software to guard against accidents. Cartridges that offer copying facilities should be used for just this purpose.

Making backups of programs can also give an increase in loading time. Using the Warp 25 option of the Action Replay IV cartridge, more of this later, the loading time of my wordprocessor was reduced from 1 minute 45 seconds to just 9, yes 9, seconds, impressive eh?

The Final Cartridge?

When the original Final Cartridge made its way on to the UK market it proved to be extremely popular. Originally the cartridge added numerous 'utility' functions to the C64, which the computer was in need of. DOS functions were added allowing the user to access a directory listing without having to LOAD it over the program in memory. Basic programmers were given a number of toolkit commands including a renumber, while machine code users were given access to a monitor that wasn't resident in the computers memory. The Final Cartridge III offers all of the above facilities and much more. For a start the C64 is given a new, Macintosh like, desktop. Pull down menus, windows and icons giving the computer owner access to many facilities via the keyboard, mouse or joystick.

Upon power up the desktop is

automatically entered, C128 owners don't panic, just press the computer's reset button and you will be in C128 mode, though I found I had to take out the cartridge in order to use 80 column mode. The desk top offers various menus. I will deal with each one in turn. First of all you are given the chance to see what version of cartridge you are using, and the authors names – all stunning stuff!

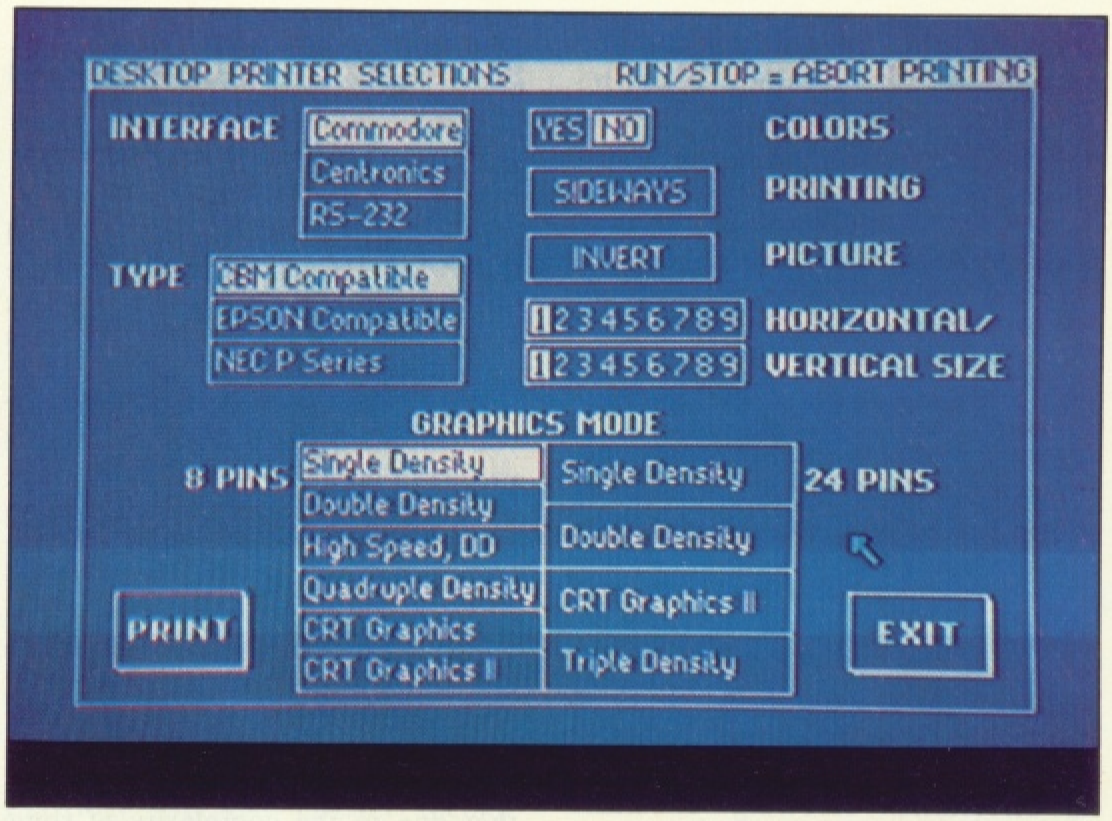
The second pull down menu, SYSTEM, is where we start to access the cartridge proper. This menu allows you to set up the mode that you are using the cartridge in. Choosing Basic drops the user back into C64 Basic, with new functions added. FINAL KILL disables the cartridge. FREEZER access the program manipulation menu which will be dealt with in a moment. The next option REDRAW does just that, it redraws the screen so that all of the windows that are open can be seen.

The third pull down menu, SYSTEM, indicates that update software will be released for the cartridge. DLINK and TLINK are detailed in the manual as starting future extensions from disk or tape. A further option NOTEPAD, gives the user access to a notepad where you can store notes and create small documents. Facilities to alter print style, line spacing, print the text and save and load documents exist.

The UTILITIES menu gives the user of the cartridge access to some of, in my mind, more useful functions of the desktop. PREFERENCES allows you to change such things as the speed of the cursor, the screen and cursor colour, which port the input device is in and whether you are using a mouse or joystick. BASIC PREFERENCES allows you to set up a number of default parameters that are used when the programmer access Basic. Facilities available are:

Turning on/off a keyboard click;
Make all of the keys auto-repeat;
Make the cursor flash, or be steady;
Set up a default device for LOAD and SAVE operations;
Set the border colour;
Give C128 users access to the numeric keypad in C64 mode.

What I feel is missing from both of the above options is the ability to save your own personal defaults on disk or tape so that you can set up the computer as you like it very quickly. At the moment you have to alter the settings yourself every time you power up.



Choosing the CALCULATOR option gives you, yes you've guessed it, a calculator. Once this is on the screen you can either move the pointer to the keys that you want to press or use the keyboard. C128 users have an advantage here as they can use the numeric keypad.

The TAPE option allows you to LOAD a program from tape. Options are given to LOAD with a normal program or one that has been SAVED using the cartridges tape turbo.

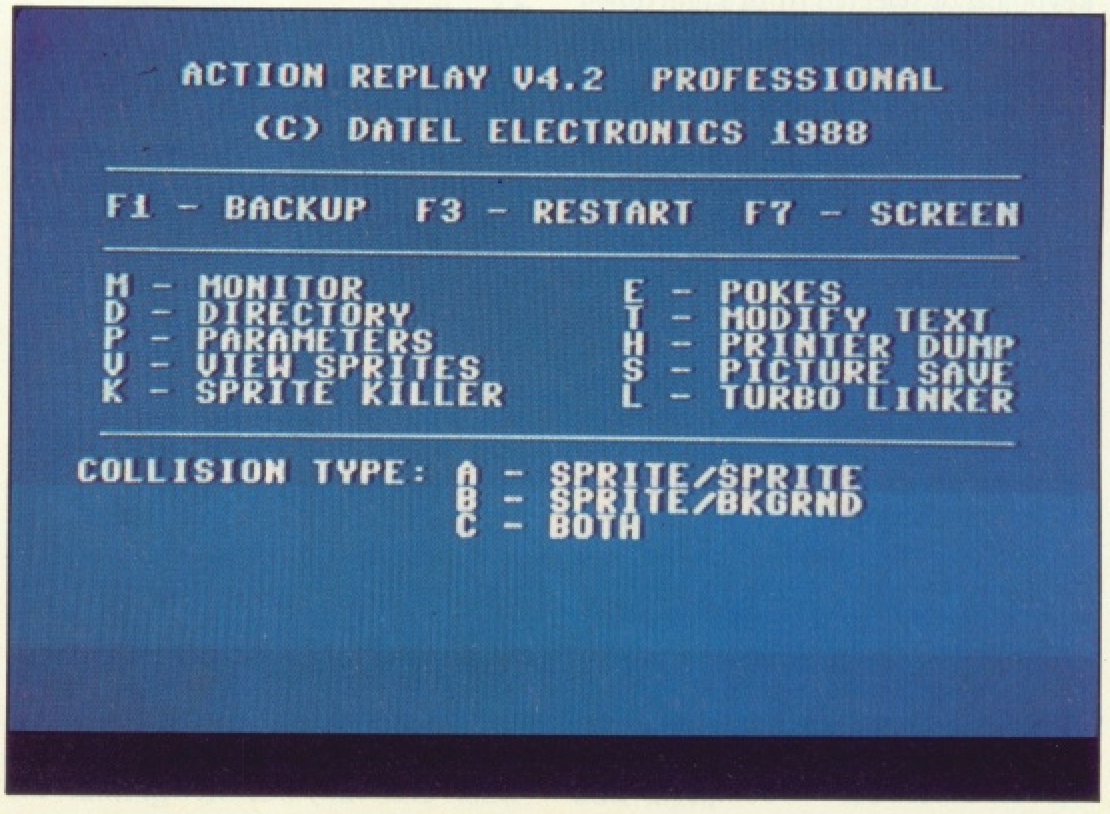
Disk users are well catered for with the DISK option. Here the user has the ability to perform any of the following:

Change a programs name;
Load and RUN a program;
Alter the name of a disk;
Fast Format a disk;
Empty a disk by just giving a new disk name;
Initialise a disk;
Validate a disk;
Scratch a program;
View a disk directory.

The directory option is quite unique as it allows you to display the contents of up to three different disks on screen at any time.

I must admit to finding use of the disk menu a little long winded. To access any command you need to perform the following:

1) If accessing a program highlight it on the directory.



2) Select the operation that you require.
3) Input any text required, such as new name, etc.
4) Select the DO option to start the command.

A newcomer to Commodore computers may find this great, personally I felt that I could enter the necessary commands quicker at the keyboard.

The last desktop option is CLOCK. This allows you to set up the time and set at alarm. The time can be displayed at the top right of the desktop bar.

Basic Plus

As previously mentioned, the Final Cartridge III adds a numbr of extra facilities to Basic, these are:
Bi-directional scrolling of Basic programs;
A printer interface;
Screen dump facilities;
A disk and tape turbo;
Pull down menus;
29 new commands;
New editing commands.

The new editing commands allow you to jump to the bottom of the screen, delete characters after the cursor to the end of the line and freeze output to the screen – useful with the LIST command.

The printer interface mentioned above allows you to connect a non-Commodore printer to the C64 via a Centronics interface.

All of the new Basic commands can either be entered directly from the keyboard or selected from a pull down menu. Obviously space won't allow me to detail all of the commands available so I'll just mention a few:
AUTO – gives auto line numbering facilities;
BAR – allows you to turn on and off the pull down menu;
APPEND/DAPPEND – adds the specified program to the one in memory from either tape of disk;
DESKTOP – takes you into the cartridges desktop;
DOS – allows you to send commands to the disk drive, and get directory listings, with ease;
DUMP – list variables used by a program;
FIND – search program for specified information;
KILL – disable the cartridge;
MON – enter the cartridges montior;
RENUM – renumber a program;
PACK/UNPACK – compress and uncompress the program in memory.
$ – allows you to use a hexadecimal number

Freezer

As I have already mentioned the Final Cartridge III allows you to make backup copies of programs, – well this is the section of the product that does it, however, it doesen't end there.

Once you have accessed the freezer you can manipulate the program in a variety of different ways. Firstly, there is an extremely powerful printer dump option that will send a copy of your current screen to the printer. One extremely impressive feature of this screen dump is the fact that not only is the backdrop sent to the printer but sprites are also printed. This is the only printer dump that I have come across that does this. It is worth pointing out that due to the complexity of some programs you can't successfully print out everything.

Cheats are catered for by the ability to disable sprite/sprite collision detection and sprite/background collision detection. When playing some games selecting these options will allow you to avoid being killed. A GAME AUTOFIRE option transforms your normal joystick into one with auto-fire capability. When you hold down the fire button the joystick keeps firing.

When finished manipulating the program in memory you have the ability to return to the program, exit to the desktop or go into the machine code monitor.

Monitoring

The machine code monitor offers all of the commands that you would expect to find such as assemble, disassemble, memory display etc. A number of other useful commands have also been added that make the monitor extremely powerful. Commands exist to edit characters and sprites. These aren't 'real' editors but allow you to enter a series of '*'s and '.'s in the shape of the character or sprite that you require. A disk monitor allows you to access and modify the internal memory in your disk drive. As well as being able to modify the internal, your drives memory facilities exist to read areas of the disk in the drive into memory.

Speeded Up

I have already mentioned that the Final Cartridge III has both a disk and a tape turbo.

To use the tape turbo you simply LOAD and SAVE programs with a device number of 7 rather than missing it out or using 1. The tape turbo is around ten times faster.

The disk turbo is automatically used with any disk command. The improvement on loading speed is around 15 times. It is worth pointing out that if a program is protected then not all of it will be loaded at turbo speed. Though this can be overcome by freezing the program. In my own tests I found that my wordprocessor actually loaded slower when the Final Cartridge III was enabled than the same program did when the cartridge wasn't present – and that program doesn't have its own turbo.

Final Cartridge?

There can be no denying that the Final Cartridge III has some extremely powerful and useful facilities. My own view is that the Basic utility commands and screen dump facilities are excellent but that the desktop facilities, though extremely pretty, are gimmicky and anyone using the cartridge will soon get fed up of using many of the facilities offered. The idea of having a notepad facility permanently available was extremely appealing to me as I could use it for writing quick memos and taking telephone messages, however when you move from Basic to the desktop any program in Basic memory is lost. In other words you have to SAVE your programs before accessing the desktop. In my mind this makes options such as the notepad and calculator useless since you can't flick between them and your program.

So would this cartridge be my Final one? Well to be honest it is good, but it's not that good.

Action Replay

Reading adverts in *Your Commodore* it sometimes seems that the Action Replay cartridge is upgraded, re-released every month. In fact the newest re-generation is only number four and is the most comprehensive to date.

So much is packed into this cartridge that Datel has had a custom LSI logic chip designed by Motorola for the cartridge. As well as this there is also 32K of ROM and 8K of RAM inside the small red box that plugs into the cartridge port.

Back Again

As with all of the previous Action Replay cartridges the emphasis on this one is the ability to backup programs. When saving a backup you are presented with various options. You can SAVE the program as one of the following types:

Standard speed:
Turbo;
Warp 25.

Standard means that the program uses the normal disk/computer LOAD routines and will re-load at the normal Commodore snails pace. A turbo saved file will re-load quicker than normal, however both of these options become redundant once you've used Warp 25 after all what's 6-7 times the normal LOAD rate?

Warp 25 files are of such a format as they can only be loaded either with the cartridge present or from a special loader program. An option exists within the cartridge to save the loader onto your disks.

All files saves at WARP 25 will re-load in 6-7 seconds, or so Datel claim. In practice loading time is a little longer as you do need to LOAD and RUN the loader program if the cartridge isn't present, however this only adds a couple of seconds onto the loading time – who needs a parallel disk operating system?

If using cassette then you too have an option regarding the speed of the SAVE. TURBO saves your programs in such a way that they will re-load at between 5 and 6 times faster than normal. SUPERTURBO saves the programs so that they will re-load at 8-10 times normal. Superturbo requires that the deck is in good condition and that you are using good quality tape. If not the results can be unpredictable.

For those awkward to copy programs facilities exist to enter POKEs into the program and LOAD parameters from a special disk available from Datel.

Pretty Pictures

As well as giving excellent backup facilities a number of graphic options also exist. As with the Final cartridge III you can disable sprite collision detection enabling you to 'cheat' at some of those difficult games. It's important to note that not every program will work with sprite detection disabled. Another parallel with the Final Cartridge III is the ability to edit sprites, however, the editing facilities of the Action Replay IV are far superior. The sprite editor is a 'real' one with the ability to display sprites in either normal or multicolour mode, change the colours, alter the sprites, invert sprites, etc. In fact as a stand alone program the sprite editor would be fairly useful. For a games programmer this non-memory resident sprite editor is a must as it will allow them to stop their program at any time, tweak the way their sprites look and then carry on with the game. The non-programmer can have great fun altering the sprites in their favourite games.

Options exist to dump screen to a printer or save it out in such a way that it can be re-loaded by an arts package such as Blazing Paddles (also from Datel). The graphic dump is not as versatile as the one on the Final Cartridge III and doesn't include sprites in the picture. Epson and Commodore printers are catered for.

One 'throw away' feature of the cartridge is the Text Modifier, this allows you to search through memory for a specific string and change it to another – great if you want to add your own name to the high score table of a game before you SAVE it.

Utilities

A number of useful facilities are provided by the cartridge. There's a fast formatter for disk users. A file copier will copy individual files, including WARP 25 files. You can even change normal programs to Warp 25 and vice versa. The file copier comes into it's own when you realise that it will work with two disk drives – no more tedious disk swapping! Should you want to copy a whole disk then a disk copier is provided for copying unprotected disks.

More from Basic

As well as providing the expected cartridge orientated facilities the Action Replay IV cartridge, like the Final Cartridge, adds a number of new facilities to Basic.

Firstly a DOS is included so that you can access the drive with ease, get disk directories etc. Furthermore the function keys are defined so that some commands can be entered with one key-stroke, for example loading and running the first program on disk.

A number of extra basic commands are provided, not as many as the final cartridge but still useful.

Naming a few of the new instructions:

OLD – will restore a NEW program.
LINESAVE – saves a range of lines to disk.
MERGE and APPEND allow you to mix/add two programs
AUTO gives automatic line numbering
PLIST sens a listing to the printer.

Monitoring

An extremely powerful machine code monitor exists within the cartridge.

Unlike all other monitors entering it doesn't perform a reset to stop the program currently running. Upon entry all of the computers memory including the screen, stack and zero page are all frozen, all 64K of the computers memory remains unaffected by the monitor.

Once again all the expected commands are present, including disk monitoring and disk editing facilities. You can examine memory contents in hex, ASCII and CBM screen codes. Conversion between binary, decimal and hex exist as does the unusual ability to perform a Basic function.

In the Ring

Both of the cartridges looked at here offer the user essentially the same facilities. The Final Cartridge is more gimmicky than the Action Replay cartridge and for me has a number of facilities that would soon become redundant.

If you are a newcomer to Commodore machines then you will probably like the pull-down menu/icon driven environment – very friendly. Furthermore, Basic programmers will no doubt find the wealth of toolkit commands useful.

If you are an advanced programmer and are more interested in programming your computer in machine code, then the monitor in the Action Replay cartridge is excellent. Disk owners will also find WARP 25 a delight. Don't forget you can even backup your own programs and save them at turbo speed.

So which one would I say was the overall winner? Well both cartridges have their own good and bad points and I could find excellent use for both of them. I could say buy both, if you did you wouldn't be disappointed. Should I have to make a decision to purchase one then the Action Replay IV suits my requirements as a serious user far better than the Final Cartridge.

Auto-Start Maker

Give your disk programs that professional look by making them auto-start

By K. Godden

Almost every piece of commercial software auto-starts when loaded from disk. Further more, many have screens that are displayed while the program is loading, giving information about the author or program instructions. Unfortunately, for many people who would like to give their own programs this professional touch, the process of auto-starting a program, let alone displaying a screen, is quite difficult.

The program presented with this article changes all of that, it allows you to alter any Basic program (less than 39K in length) so that it will auto-start on loading. It also allows you to design your own loading screen, using characters accessible from the keyboard, that will be displayed while the program is transferred from disk into the computer's memory.

Protection Plus

Apart from the convenience of your program auto-running, because the program auto-runs you will be able to protect your masterpiece from prying eyes. A simple method of protection would be to make the following instruction the first in your program: POKE 808,251

This quite simply disables the RUN/STOP and RESTORE keys. Further protection could be added, such as a routine to erase the program on a reset etc.

The AUTO-START MAKER program loads the Basic program into reserved memory. It then writes the program to disk with the necessary machine code, and the loading screen. This process adds about 6 blocks (1.5K) to the program length, about 1K of which is the loading screen. To use the adapted program type:
LOAD "progname",8,1

The ,8,1 must not be left out or the program will not RUN. If the Basic program loads any machine code files etc. It should contain POKE 157,0 before the LOAD command, otherwise the computer thinks it is in direct mode, and print the normal loading messages.

Auto-Starting a Program

A detailed breakdown of the operation of the AUTO-START MAKER is given below. Careful reading and following of these instructions should give success every time.

To start the AUTO-START MAKER simply LOAD and RUN it. There will be a short delay while it loads two machine code files from disk. The main menu is then presented.

The MENU has the following options:

COMMENCE AUTO-START PROCEDURE – This option reads changes and re-writes the Basic program that you wish to auto-start.

DESIGN LOADING SCREEN – Selecting this option puts you into the screen editor. To exit the editor press the F1 key. The screen that you have been working on will not be lost.

LOAD LOADING SCREEN – Allows you to LOAD a previously designed screen into the editor.

SAVE LOADING SCREEN – Puts a copy of the current editor screen onto disk.

READ DIRECTORY – Displays the contents of the disk error channel on screen.

NOTE. It is not necessary to SAVE the loading screen with the above option. This simply allows you to SAVE a copy of a screen for later re-call. The COMMENCE AUTO-START PROCEDURE saves the editor screen with the 'new' Basic program.

To use the program simply design, or load a previously saved loading screen. F2 allows you to design your own screen. Use the normal keyboard characters and editing keys (cursors etc.) to design your screen. When the cursor comes to the bottom of the screen it will appear at the top.

The colour keys have no effect on the display as the colour of the loading screen is pre-determined by the colour memory on loading.

Once your screen is designed press F1 to finish.

Next select the COMMENCE AUTO-START PROCEDURE option (F1). You will then be asked if there is a screen in memory. If there isn't you will be returned to the menu.

The next prompt asks you for the name of the program that you wish to convert to auto-start.

Remember, this program must be in Basic and must be less than 39K.

If an error occurs then DISK ERROR will be printed on screen and you will be asked to re-enter the program name.

Once a program has been successfully chosen and entered into the computer's memory you will be asked to enter a name for the new version of the program. You can replace the original but it's safer to

give the program a different name.

Your program will now be re-written to the disk with the extra 6 blocks added and will auto-start on loading, as long as you remember the secondary address.

Getting it all in

There are two programs published in the magazine, AUTO START DATA and AUTO-START MAKER. Type in both programs separately and SAVE them to disk before you RUN them.

The program AUTO-START DATA reads two machine code files from DATA statements into memory and then, via one of the machine code routines, writes them onto disk. The program AUTO-START DATA is no longer required.

The program AUTO-START MAKER is the program that you should now LOAD when you want to make an auto-start program. When RUN this will automatically LOAD into the computer's memory the two programs created by AUTO-START DATA.



When entering the AUTO-START MAKER program pay particular attention to lines 170-390. Accuracy of these lines is essential for the program to work correctly.

Closing Notes

Although it is stated in the above text that you can't auto-start a machine code program with the routine presented here, there is an exception. If the machine code program has a line of Basic with a SYS call it should then auto-start.

If you don't want a loading screen when your program is loading, go straight to the COMMENCE AUTO-START PROCEDURE option. When asked if a screen is in memory type 'Y'. A completely blank screen will be displayed when loading back your auto-start program.

See listing on page 84

COMPUTEC

SKC Authorised Distributor

SKC® Special Offer - Unbeatable Value

All goods despatched the same day

5.25"		Price for 10	Offer
Single Sided, Double Density	48 tpi	£7.47	+2 Free Disks
Double Sided, Double Density	48 tpi	£ 8.05	+2 Free Disks
Double Sided, Double Density	96 tpi	£10.35	+2 Free Disks
Double Sided, High Density	96 tpi	£17.25	+2 Free Disks
3.5"			
Single Sided, Double Density	135 tpi	£14.95	+1 Free Disk
Double Sided, Double Density	135 tpi	£ 18.40	+1 Free Disk

All prices include VAT & Delivery

Each disk is 100% inspected and certified error free, and carries a

LIFETIME NO QUIBBLE GUARANTEE

Dealer and Educational enquires welcomed. Please Fone.

Computec
Freepost
Pimperne
Blandford
Dorset
DT11 7BR

How to order:

1 Access/Visa - Give card number and expiry date by fone or post.
2 Cheque/Postal Order - Payable to "Computec" By Post
3 Personal Callers Welcomed please fone for an appointment.

24 HOURS FONE A FLOPPY 0258 59330

Clear With Basic

Clear your text screen in many different ways with this handy set of routines

By N. Higgins

The clear screen function of the C64 does just that, it clears the screen in one go. In many cases this is all that you require within a program. There are times, however, that it would be nice to clear your screen in a different way just to make your program look that little bit special.

Presented here are some simple Basic routines which will enable Basic programmers to clear their screens in a variety of different ways, instead of the usual 'PRINT CLR/HOME'.

Using the ROM

Three ROM routines exist within the C64 that enable us to play around with the way that the screen is cleared. Two positions the cursor, the other clears an entire screen line. We will use these routines in some of the examples presented here. First it is important that we shed some light on the use of the routines.

To position the cursor you use:

```
POKE211,X:POKE214,Y:SYS58732
```

Or:

```
POKE781,Y:POKE782,X:POKE783,
0:SYS65520
```

Where Y is the row from 2 to 24 and X is the column from 0 to 39.
To clear an entire screen line you use:

```
POKE781,Y:SYS59903
```

Where Y is the same as above.

The Listings

Our first program LISTING 1, is the base for many of the other routines so type this in and SAVE it. When you enter the other examples you need only insert the new lines given into a copy of LISTING 1.

If you RUN LISTING 1 and press a key once the screen is full, you will see the screen clear from top to bottom. You may not think that this is that fancy but it does get us started. Careful examination of the listing should make it clear how the program works.

Now let's reverse LISTING 1 and make the screen clear from the bottom of the screen to the top, easy, just type in the new lines of LISTING 2. Just by adding an extra variable (B) and incrementing this by one every pass through the loop we reverse LISTING 1. It's very simple and works a treat.

Now that we've got a couple of simple clear-screen routines let's jazz them up a bit. Insert the new lines of LISTING 3 into LISTING 1 and RUN it. We now have a screen clear starting from the bottom left and going in an up/down fashion in columns of 10 characters.

On to the next routine. Add the lines of LISTING 4 to LISTING 1 and RUN it. The screen will now clear in four sections all emanating from the centre, very easy this one. Why not try to combine the four sections together so that they clear at the same time?

LISTING 5 gives a partial answer to the above problem, again add the lines to LISTING 1 to see the program work. RUN this and you will see the screen clear in four sections all at the same time.

Still not impressed? Okay, now for a couple of more dramatic routines. Insert the new lines of LISTING 6 and RUN it. After pressing a key you will see the screen contents disappear in a more unusual way, starting from the top left and ending at the bottom right.

The next example given is more suited, in my opinion, to games. Maybe it could be used for clearing the screen then the game is over. Insert the lines of LISTING 7 in LISTING 1 and RUN it. You will now see the contents of the screen disappear from the four corners of the screen towards the centre. Excellent, and all from Basic.

If the routines presented here are too slow or too fast for your requirements, then you can alter them. Of course if you want to clear your screen really quickly then you will have to resort to machine code.

This brings us onto our latest example where we have a machine code routine that will clear the screen from right and left towards the middle. Add the lines from LISTING 8 to LISTING 1 and RUN it. When you press a key you will have to wait for a few moments for the machine code is POKEd into memory. Not very fast from machine code you might say, but by POKEing memory location 49223 with a number from 1 to 255 you can change the delay. 1 is the fastest and 255 the slowest. Even with the delay set to 1 the routine isn't the fastest that could be written, then again, if the screen was cleared any faster then you wouldn't see it so what would be the point of using a fancy routine?

Back From The Past

For more examples of clearing the screen with machine code, refer to a past article in *Your Commodore* September 1986 called 'All Clear'.

Incidentally you could use the ROM routines mentioned in the article to position the cursor anywhere on the screen. Just set up two variables X and Y to the correct column and row and produce a subroutine to call the ROM routine and position the cursor. YC

See listing on page 91

earing the
Insert the
ING 1 and
e contents
m the four
wards the
om Basic.
d here are
for your
alter them.
clear your
you will
code.
our latest
machine
the screen
he middle.
ING 8 to
When you
wait for a
ine code is
very fast
ht say, but
tion 49223
55 you can
fastest and
he delay set
astest that
ain, if the
er then you
uld be the
ine?

learing the
, refer to a
Commodore
l Clear'.
d use the
n the article
here on the
ables X and
nd row and
ll the ROM
ursor. YC

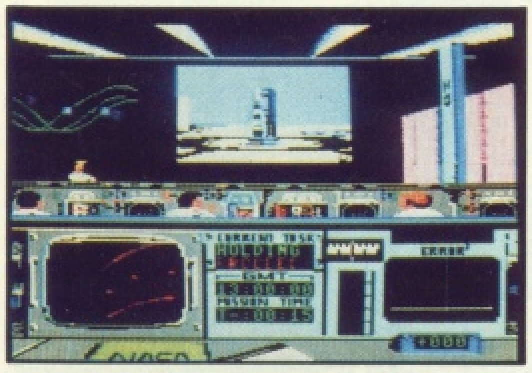


Games Update

*T*he perceptive among you will have noticed that we have adapted a new style for reviewing games this month. Not every game received will now get a full review. Instead, four to six of the more interesting games will get reviewed in depth each month and the rest will get lumped together in one large summary. This style is largely experimental so please write in and let us know what you think.

Full Price Games

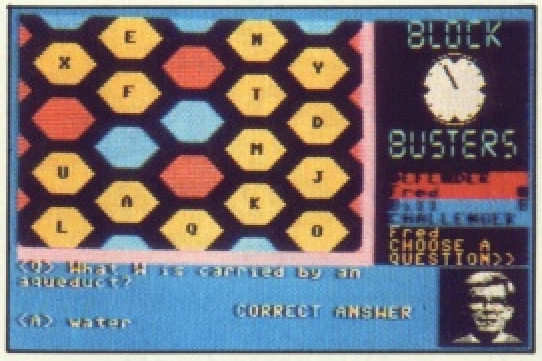
APOLLO 18 (Electronic Arts) is an appropriate title to launch the new section. Here is your opportunity to participate in a cross section of missions from the American Space Program. You must blast off, dock, land on the moon, explore the moon's surface, take off from the moon and re-dock, walk in space and finally re-enter the Earth's atmosphere and splash down if you are to accomplish everything successfully.



The game looks as if it is going to be an enormously complicated flight simulator but in fact, it is considerably simpler than that. Most of the actions required of you involve no more than pressing your fire button at the appropriate moment. Be warned though, timing is absolutely critical (measured in thousandths of a second) and too great an error will result in the entire mission being aborted.

The program itself is extremely well constructed ranging from the variety and quality of the graphics to the crackly speech which adds just the right amount of atmosphere. All that is really lacking is gameplay – there just isn't enough of it and I fear that none space fanatics will soon tire of the game.

Another way of exercising your grey cells, albeit somewhat easier than piloting a space rocket is answering

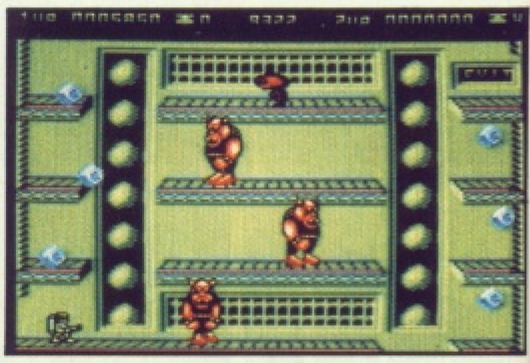


questions on one of the numerable quiz shows on television. Should you not be able to get enough of your daily fix, Domark have come to your aid with a computer version of BLOCKBUSTERS on their TV Games label.

For anyone unfamiliar with the game, the playing area consists of a matrix of hexagons each containing a letter. The players are then asked a question the answer to which begins with the letter that is in the hexagon. Getting the answer right changes the hexagon to your colour and the object of the game is to form a continuous line of your colour joining opposite sides of the grid.

The game is designed for two players and this tends to cramp things somewhat round the keyboard. The computer decides which player has pressed their 'buzzer' first and invites them to type in their answers. In theory, it doesn't matter too much if your spelling is a bit iffy as the computer will 'guess' what you meant and answer accordingly. This worked well on some occasions and badly on others. Surely it would have been better to ask the player to shout out the answer and use the joystick to point to a right or wrong box accordingly.

On winning the best out of three games, the victor is invited to take part in a Gold Run which is more of the same except that phrases instead of single words are used. This unfortunately degenerates into a test of typing speed rather than any other ability. The graphics are adequate complete with a digitised picture of the host Bob Holness shaking his head dementedly. The game itself though does not adapt particularly well to computer format and I would suggest that you stick to watching it on the box.



OCTAPOLIS from English Software is a very slickly produced shoot-em-up but you can't help but feel that you have seen it all before. After the usual inane plot, it transpires that as usual, you are the only person in the entire galaxy who is immune to the threats of the Galactic Imperium and it is up to you to save the world. Again!

The game is in two parts starting off with you attempting to blast every thing in sight. A split screen is used to represent the action in 3-D (remember Sanxion) and you have to shoot down a given number of battle fleets before you are allowed access to the second part of the game. After successfully docking, you are transported below the surface of the city where you must leap from platform to platform avoiding marauding robots and evil eyes. Comparisons with Impossible Mission are I am afraid inevitable. Get out of this one and it is onto the next city etc. etc.

The game actually plays very well but surely there must be some originality left in this industry somewhere.

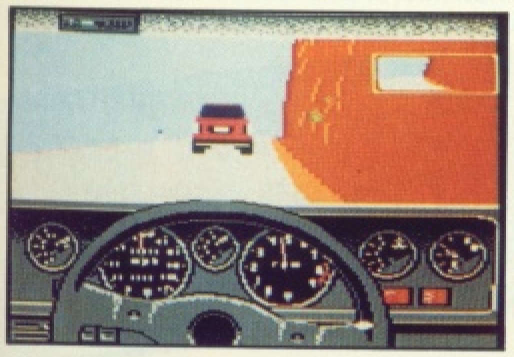
Fans of the cult comic 2000 AD will be interested in the next offering – SLAINE produced by Martech. The land of Lyonesse is under the evil reign of the Drune Lords and it is up to you, Slaine, with a little help from your none too willing side kick Ukko to rid the land of this terror.

Slaine is a menu driven adventure although it is unusual amongst similar games of this genre in so much as there is also a combat system. Slaine's actions are also governed to some extent by his warp rating. This is a measure of his strength and power which decreases as he gets wounded or hungry. Maximum warp power is needed before Slaine can go beserk in

combat.

This game is totally ruined by one serious fault in the game design. The Reflex system of selecting your commands. The initial series of actions (known as main thoughts) scroll and flash across the menu box. You have to control a severed hand and point to the command that you want. Timing is important and if you misjudge things, you are quite likely to select something entirely different from what you intended. This is no more than a gimmick but it renders the game unplayable to all but the most ardent 2000 AD fan. Certainly, traditional adventurers will hate it.

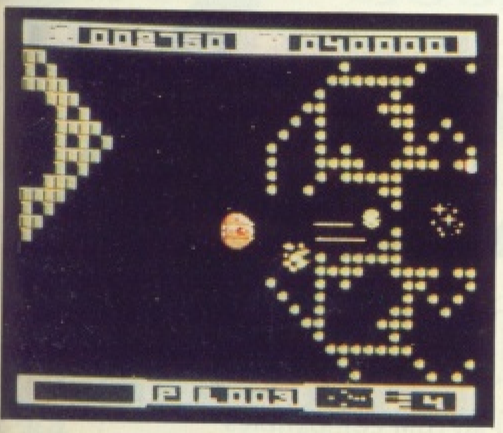
If you have ever dreamed of being a



Yuppie, if only to be able to afford a Porsche, TEST DRIVE from Electronic Arts may prove to be the next best thing. You are given the chance to test drive one of five of the world's top sports cars. Apart from the Porsche 911, there is also a Lamborghini Countach, a Lotus Turbo Esprit, Ferrari Testarossa and a Corvette.

Obviously these are not cars designed to stick to American speed limit of 55 mph. With top speeds in some cases of over 170, it is only natural that you would want to put to the car through its paces. The only trouble is that the local police are none too happy if you try to burn them off. Some you can pull away from but others will force you to stop and accept a ticket like a man.

Test Drive plays reasonably well but is lacking a certain something that keeps it from being one of the top notch racing simulations.



128 different levels coupled with 8 different bonus screens sounds like the committed zapper's dreams come true. HUNTER'S MOON from Thalamus is their fourth shoot-em-up but unfortunately their weakest to date.

After inadvertently entering a black hole, you find yourself in a strange region containing hive like structures that regenerate almost as quickly as you can blast them. Your task is to locate all the Starcells on your radar and collect them. As you progress through the various systems, so you can gain co-ordinates allowing you to skip levels.

Although the game is very well put together, I found it lacking that one vital ingredient of all classic shoot-em-ups, addictiveness.

Another shoot-en-up on offer is M.A.C.H. from Starvision, a Danish company. Again, the plot is somewhat familiar. As Knight of the Galaxy, you are trying to rescue three planets from



slavery.

The only thing about this game likely to tempt anyone other than total arcade freaks is the offer of an Amiga should you find the secret password. Otherwise, you've seen it all before.

Budget Games

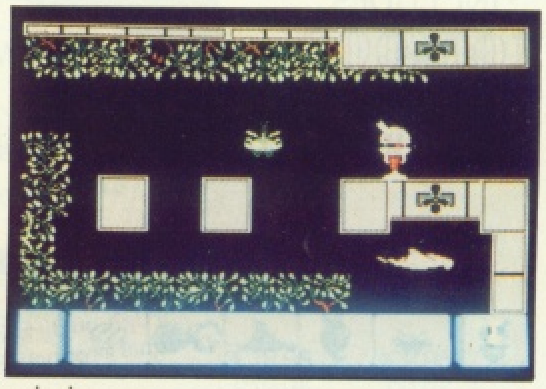
CODE HUNTER from Firebird sees you battling against a battlestar of unknown origin. Your only hope is to discover the necessary codes to deactivate it. To do this, you must enter each of the computer networks and destroy the guards there before you can escape with the relevant bit of code.

Each section of the computer consists of a screen made up of squares. You move round this leaving bombs onto which you must lure the guards. The problem is that the sqaures consist of one way transporters, teleport systems and energy modifiers. This means that your path must be chosen carefully.

This is a nice little arcade/ strategy game let down slightly by poor graphics and the fact that once you have worked out how to complete a particular screen, you need never get killed there again.

LEGEND OF THE AMAZON WOMEN from Mastertronic is a horizontally scrolling beat-em-up. The Amazons were a ferocious tribe of female warriors although you would never guess it from this as they look more like they are trying to tickle each other with feather dusters rather than beat each others brains out. All this plus trying to dodge numerous arrows. Give it a miss.

ARAC from Addictive is a much better game. Originally released at full price, it never received the recognition due to it. An arcade adventure with some good graphics. You are Arac, a droid albeit with a few bits and pieces



missing.

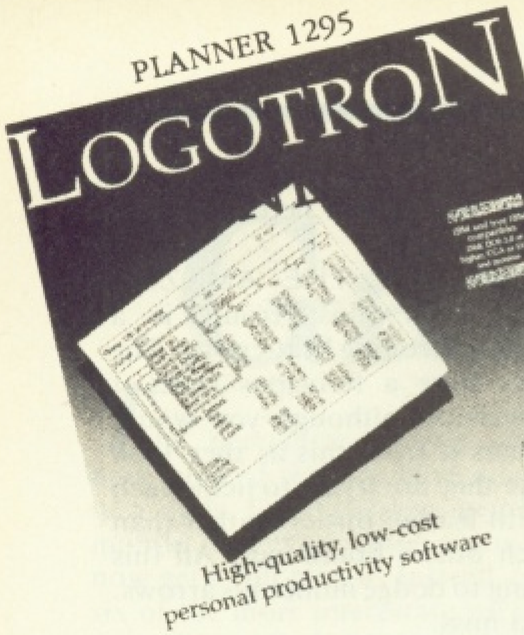
As well as retrieving your missing legs and power orb, you must also cast your net to capture the various creatures that inhabit the labyrinth. These will then help you in return for their freedom. Each of the five creatures has different powers eg trhe big borer can gnaw through solid walls whereas the ray will help to confuse the enemy radar. Definitely a game worth looking out for.



PUB GAMES from Alligata is another previously full price offering that may appeal. Seven different games that you play from the comfort of your own armchair, presumably with a can or two of ale for accompaniment.

There are a number of quirks in the game such as players swapping sides part way through the events but on the whole, Pub games is a good laugh and a worthwhile antidote to all those decathlon type games. YC

PLANNER 1295



SPREADSHEET
£12.95

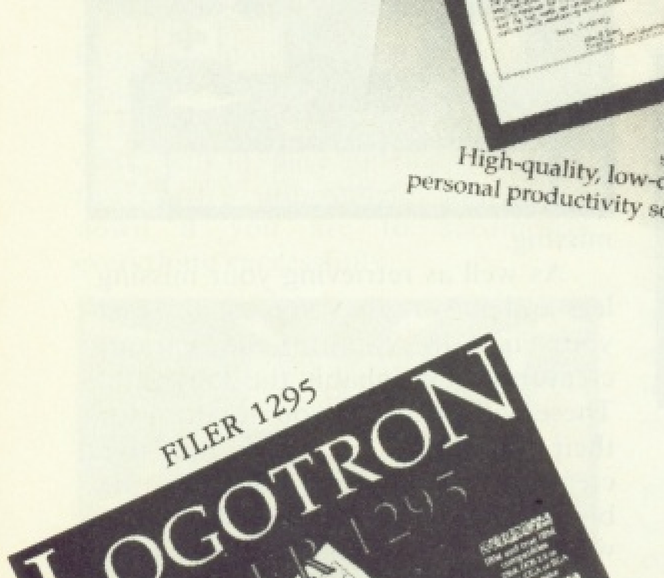
WRITER 1295

INCLUDES
100,000
WORD
SPELLCHECKER



WORD PROCESSOR
£12.95

FILER 1295



DATABASE
£12.95

1295 is all you need

LOGOTRON

1295 BUSINESS SERIES

Fully integrated software for the Commodore 64/128, IBM PC and all IBM compatibles

For all the information telephone or write to **Richard Laidler** at;
Logotron Business Products, Dales Brewery, Gwydir Street, Cambridge England CB1 2LJ ☎ (0223) 323656

CLUB 68000

DO YOU OWN AN AMIGA OR ATARI ST COMPUTER?

For everyone who owns one of these computers the CLUB 6800 offers members software, hardware & accessories at a saving up to 50% OFF RECOMMENDED RETAIL PRICES. Each item has been carefully chosen to offer the best value & quality

HERE'S WHAT YOU GET

When you join you will receive a FREE DISK with 10 GAMES (monochrome or colour).
A FREE CATALOGUE: with the TOP COMMERCIAL products with HUGE DISCOUNTS (TOP 20 GAMES, TOP 10 BUSINESS PROGRAMS, HARDWARE & ACCESSORIES).

- NEW CATALOGUE every 3 months.
- NEWSLETTER every month with SPECIAL OFFERS on all the latest products.
- Special PUBLIC DOMAIN SERVICE: Best quality collection of PD software for the AMIGA/ATARI ST in the world.

HERE'S WHAT YOU DO

Just fill in the coupon below and return it to CLUB 68000. Your only commitment is to pay £10.00 for 1 years membership. You will then receive the CLUB 6800 GAMES COMPENDIUM (10 GAMES), your first copy of the FREE 68000 CATALOGUE, plus any items you have chosen at the special introductory prices.

JUST BY PURCHASING ONE PRODUCT FROM THE INTRODUCTORY OFFER, IT WILL MEAN YOUR MEMBERSHIP WILL COST YOU NOTHING.

SPECIAL INTRODUCTORY OFFER

There couldn't be a better time to join, from all the products listed below. 50% DISCOUNT on GAMES & 30% DISCOUNT on BUSINESS PROGRAMS, CHOOSE AS MANY ITEMS AS YOU WANT, IT'S UP TO YOU.

AMIGA HARDWARE	RRP	MEMBER'S PRICE
3.5″ Disc Drive	£139.95	£89.95
5.25″ Disc Drive	£169.95	£129.95
A500 2 MEG RAM Expansion	£499.00	£399.00
A1000 2 MEG RAM Expansion	£499.00	£369.00
A500/1000/2000 Sound Digitizer	£89.95	£69.95
A500 512K RAM Expansion Plus Clock	£119.95	£84.95

AMIGA GAMES	RRP	MEMBER'S PRICE
1. Hunt for Red October	£24.95	£12.45
2. Insanity Flight	£24.95	£12.45
3. Hollywood Poker	£19.95	£9.95
4. Time Bandit	£24.95	£12.45
5. Barbarian	£24.95	£12.45
6. Jinxter	£24.95	£12.45
7. Defender of the Crown	£24.95	£14.95
8. World Games	£24.95	£12.45
9. Winter Games	£24.95	£12.45
10. Gold Runner	£24.95	£12.45

AMIGA BUSINESS PROGRAMS	RRP	MEMBER'S PRICE
1. 64 Emulator	£69.95	£48.95
2. Drum Studio	£49.95	£34.95
3. Superbase	£99.95	£69.95
4. Gizmoz	£49.95	£34.95
5. Omega File	£49.95	£34.95

ATARI ST HARDWARE	RRP	MEMBER'S PRICE
3.5″ Disc Drive	£129.95	£89.95
5.25″ Disc Drive	£169.95	£129.95
512K RAM Expansion	£79.95	£59.00

DISCS	RRP	MEMBER'S PRICE
3.5″ DSDD	£14.95	£9.95
5.25″ DSDD	£9.95	£4.95

ATARI ST GAMES	RRP	MEMBER'S PRICE
1. Startrek	£19.95	£9.95
2. Star Wars	£19.95	£9.95
3. Dizzy Wizard	£19.95	£9.95
4. Barbarian	£24.95	£12.45
5. Winter Olympiad	£19.95	£9.95
6. Psion Chess (3D)	£19.95	£9.95
7. Hunt for Red October	£24.95	£12.45
8. Skyrider	£19.95	£9.95
9. Bubble Bobble	£19.95	£9.95
10. Jinxter	£24.95	£12.45

ATARI ST BUSINESS PROGRAMS	RRP	MEMBER'S PRICE
1. PC Ditto	£89.95	£62.95
2. Superbase	£99.95	£69.95
3. Fleet Street Publisher	£115.00	£85.00
4. 1st Word Plus	£79.95	£55.95
5. Art Director	£49.95	£34.95

INTRODUCTORY OFFER:

Mail to: **CLUB 68000 LTD**, 52 Linkfield Road Isleworth Middlesex TW7 6QH

Please send me: ______________________________

Free Post & Packaging within the UK. Europe £1.00

☐ Cheque enclosed ☐ Visa ☐ Access/Mastercard

Credit Card Number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Expiry Date ____________ Signature ____________

Name ____________ Address ____________

Telephone Number ____________ Post Code ____________

FREE GAMES COMPENDIUM: ATARI ST ☐ MONO ☐ COLOUR ☐ AMIGA ☐

Tabulate

Give your numerical printouts that professional touch with this Basic subroutine

By D.J. Tripp

Computers are excellent for performing repetitive sequences of complex mathematical calculations, and churning out large masses of highly accurate answers. One thing that most versions of the Basic language are very bad at is giving you the result in a neat and readable form.

In this respect, Commodore Basic is typical. There is no way to control the format of the numbers, with the computer making its own mind up when to change from the "decimal" (123.456) to the "scientific" (1.23E+4) modes. You cannot decide how many digits will appear after the decimal point, or if there are to be "trailing zeros" to pad all numbers out to a standard length. As a consequence, the length of number strings may vary from three (sign,one digit and the following space) to sixteen characters (sign,nine digits plus decimal point, "E" sign, two digits and following space).

The commands available for controlling the print-out are also primitive. The TAB, SPC and "comma" functions are all cunningly arranged to work to the start of the number string, so unless your answers all have the same number of digits ahead of the decimal point it wanders around the column at will. This is especially annoying when you are printing out columns of money.

The "comma" tabulation facility is usually of little or no use, especially when there is no way to control the column width it provides. The C64 presets this to ten, which means that although short strings do line up reasonably tidily, the longer ones spill outside their own column and force the next number to be displaced into the next one, which in turn often means on to the next line. You are almost certain to end up with your numbers scattered at random across the page, with the headings either sitting over the spaces between the numbers or over the wrong column altogether!

In many cases, use of the "Rounding function", or:

FNR(X)=INT(1000*X+.5)/1000

to give its "three decimal places" form, together with the TAB function, will give a reasonably neat layout to be put to the screen. However, this function does not stop the numbers switching from normal to scientific notation, and the TAB,SPC and "comma" still line up on the first character.

In addition, there are two other nasties lurking in the background which this method is powerless to deal with:

- Your printer almost certainly does not recognise the TAB function, and the printout will wander all over the place. All the effort you have put in to get the screen layout nicely organised is therefore wasted.
- There are certain "magic" numbers which do not print out as you would expect them to, and instead of getting the expected number of decimal places printout, you get the full length string. If you are trying to fit numbers into narrow columns, these numbers will spill out and upset the rest of the line.

If you have not met these "magic numbers" before, try entering "PRINT 5.517" in immediate mode or as a line in a program, and see what happens. There are quite a lot of these numbers, and if the result of any calculation, including the "Rounding Function", hits them, this effect occurs. Try rounding 100*SIN(1) to three places of decimal to see another "magic" number. Again, this problem is not a Commodore Basic exclusive.

TABULATE was written to overcome most of these problems, and to provide a few other aids to neat result tables while it was about it, leaving you free to think about the real job your program is supposed to be doing.

It doesn't do all the work for you, in that it cannot decide on the best layout for your answers – you still have to think this out for yourself.

What it does do is to let you choose such things as the numerical notation, the width of each column, the position of the numbers within this column, and the number of decimal places displayed in a simple way, and to let you alter them without having to rewrite half your program to keep the whole thing presentable.

It also lets you put the headings nicely centered over each column, and keeps them there if you change the column width.

TABULATE works with the output sent to screen or printer looking the same, as it does not use the TAB function. Because of its simple control over the column widths and the type size of the numerical strings, you can experiment with the layout with these set to give everything contained within the screen boundaries, and when satisfied, change the parameters so that it fits the printed page to better effect.

I cannot claim it to be perfect. One thing it does not overcome is the fact that you cannot set spacings to a half-character value. Depending on whether the numbers and headings have odd or even character counts, and the column widths are odd or even, so some headings may look to be offset to one side or the other of the "visual" centre of the column. If this happens, try increasing or decreasing the offending column width by one.

General Description of the Program

TABULATE makes use of the "Rounding function", combining this with extensive use of the string handling functions to perform its various tasks.

The program is controlled in two ways, 1) by means of a "format control string", FM$ (see below for a description of this), or 2) by directly respecifying one or more of the program constants.

Once the format has been established for each column,. the headings are printed by assigning the text to PE$, and the numbers by assigning their values to PX.

Sample of Tabulate Demo

```
 ------------------------------------------
 :      :          PER METRE              :
 :      :---------------------------------:
 : DIAM :   VOLUME    :     PRICE,£       :
 : (CM) :  (CU. CM)   :(INC. HANDLING):
 :----------------------------------------:
 :   0  :         0   :        5.00       :
 :   0  :         1   :        5.18       :
 :   1  :        79   :       23.06       :
 :  10  :      7854   :    1,811.42       :
 : 100  :    785398   :  180,646.58       :
 ------------------------------------------
PRINTOUT WITH DATA LINES:-
160 DATA 6R0D2,12R0D6,15M2D4
200 DATA  2
```

Printed using values of DATA as given in the listing. Note the unsuitable choices of PLaces in first two columns & cramped effect in last column.

```
 ----------------------------------------------------
 :        :              PER METRE                  :
 :        :-----------------------------------------:
 :  DIAM  :     VOLUME     :       PRICE,£          :
 :  (CM)  :    (CU. CM)    :(INC. HANDLING)         :
 :--------------------------------------------------:
 :   0.01 :        0.008   :            5.00        :
 :   0.10 :        0.785   :            5.18        :
 :   1.00 :       78.540   :           23.06        :
 :  10.00 :     7853.982   :        1,811.42        :
 : 100.00 :   785398.163   :      180,646.58        :
 ----------------------------------------------------
PRINTOUT WITH DATA LINES:-
160 DATA 8R2D2,14R3D6,16M2D6
200 DATA  2
```

Better effect obtained by changes to FM$ part of DATA.

```
 ----------------------------------------------------
 :        :           PER UNIT LENGTH               :
 :        :-----------------------------------------:
 :  DIAM  :      MASS       :    TOTAL COST         :
 :  (CM)  :     (GRAM)      : (£ STRERLING)         :
 :--------------------------------------------------:
 :   0.01 :   7.8500 E-3 :              5.00        :
 :   0.10 : 785.4000 E-3 :              5.18        :
 :   1.00 :  78.5400 E+0 :             23.06        :
 :  10.00 :   7.8500 E+3 :          1,811.42        :
 : 100.00 : 785.4000 E+3 :        180,646.58        :
 ----------------------------------------------------
PRINTOUT WITH DATA LINES:-
160 DATA 8R2D2,14E4,16M2D6
200 DATA  2
```

Same column widths, but change of header text, again in DATA statements. Also shows the "E"ngineering format.

Tabulate

The program sorts out what you have sent it, you don't have to alter anything else to go from text to numbers.

There are four parts to TABULATE:-

• INITIALISE, DEFAULT VALUES (lines 60000 to 60060) is a short initialisation routine which sets up the default values and defines SP$ (which is used by the justification routine, part 3). The values given in the listing are my own choice; you can obviously change these to suit your own requirements. This routine must be called before any call to parts 3) or 4) are attempted, unless you incorporate equivalent lines in your own program, in which case you can leave part 1) out altogether. The various REM statements in this section should help you identify what each variable is used for.

• READ FM$ (lines 61000 to 61210) reads the format string (FM$) to extract the new parameters. You enter this routine with a valid format string (see below).

• FORMAT AND PRINT PE$/PX (lines 62000 to 62530) forms the main part of TABULATE. You call this routine to print either the column headings (sent as PE$) or the numbers (sent as PX) to the current format.

This routine does not send a "return" after it prints the formatted result, so you must follow it with PRINT if you have come to the end of a line.

Note that PE$ and PX are automatically cleared by this routine, and their values are not available for use by your program afterwards. If you want to do this, you must assign them to some other variable first.

• REFORMAT, & PRINT PE$/PX (line 63000) is a one-liner which is included for your convenience. It allows you to define a new format via FM$, and a new input number or heading, and make just one call to this routine to print out the new item in the new format, rather than calling parts 2) and 3) separately.

FORMAT STRINGFM$

This string is most useful if you want to change all or a few of the formatting parameters from the default or current values in one go.

FM$ is made up as follows:

FM$=" <CO> <TY> <PL> <JU> <SI>"

where:

<CO> = (CO)lumn width, or field width

TY> = (TY)pe of numerical notation

<PL> = the number of decimal (PL)aces to be displayed

<JU> = (JU)stification of item in the column

<SI> = (SI)ze, or the number of decimal places expected ahead of the decimal point. This is only used with the "Rounded" notation, allowing you to position the decimal point so that there is sufficient room to the left of it to accommodate the largest number you expect in your answers. If you set SI too small, you may find the bigger numbers are pushed to the right to get them in, and your neat line of decimal points is spoiled!

The types available are:-

R – The normal or "decimal" notation,(R)ounded up to (PL) places of decimals. (Note the rounding up is done on the ABSOLUTE value of the number, thus –1.15 will be rounded to –1.2 to one place of decimals, rather than 1.1). Numbers with less than PL decimal places after the decimal point will be padded with trailing zeros.
M – (M)oney format. As "R"ounded, except that the numbers are broken up by the conventional commas at the thousand, million and one thousand million points.
S – (S)cientific notation, again with the values rounded up as described for "R" notation.
E – (E)ngineering notation. This is similar to the scientific notation, except that the powers of ten change in steps of three. Probably most used by electronics engineers.
U – (or any other letter except, R,S,M or E) – (U)nchanged prints numbers just as the computer sends them. Most useful if you have chosen the "R" format and all your printouts are 0.000. Change the format to "U" and it will let you see if it is your program that is at fault, or if you have chosen an inappropriate format for the results!

The output may be JUstified:
L – to the (L)eft of each column
R – to the (R)ight of each column
C – (or any other letter except L or R) – (C)entred, with the decimal points aligned down the column.

"Read FM$", routine 61000, reads FM$ item by item from the left. If the first item is a NUMBER, this will be read as (CO)lumn width. The first LETTER is taken as (TY)pe, and so on.

Therefore, if you want to change the number of decimal (PL)aces displayed, you MUST precede it with the (TY)pe you are using, as otherwise "Read FM$" sees the number as (CO)lumn width. Similarly, if you want to change the (JU)stification, you must precede it with the current (TY)pe letter, or your JU letter will be taken as the (TY)pe, with (SI)ze (if you have included it) read as PL.

Within these rules, any item may be omitted, in which case the variable it represents will retain its current value. Once you have set up all the format values (by GOSUB 60000), you only need to put in the things you want to change.

Examples of valid forms of FM$ are:
FM$=" " gives all default values.
FM$='16R4C4" redefines all the parameters.
FM$="RC4" (CO)lumn width and (PL)aces unchanged, "R"ounded notation selected with an offset expecting numbers with a (SI)ze of 4 characters ahead of the decimal point.

Formatting with Tabulate – Demo

The power of FM$ formatting comes into its own when you want to make up complex tables with many changes of format. In this case, you can load all the FM$ values into a string array from easy-to-find DATA statements, and call them up either from a "FOR...NEXT" loop which also calls your results in order, or by the array number in the sequence you require them.

In some cases it will be found quicker to change a single formatting parameter directly. For example, if you only want to change the column width from its last value to, say, 20 you would just put "CO=20" before the next number.

I have included a short(ish) program, called by the inspired name of "DEMO", which should make use of both methods of control clearer. This little program shows in particular how FM$ and the four routines of TABULATE can be used to best advantage.

The program itself does not do anything very clever, and most of it consists of table formatting (I did say at the start that you may still have a lot of work to do!). But you will see how all the controls for the printout can be contained in DATA statements, and how the "read FM$" routine may be used to extract information from the data to control, for example, the lengths of the dividing lines separating the parts of the header.

DEMO prints the DATA lines out for you after each run, so you can easily make changes and re-run the program to see the effect (As written, some of the choices made initially are not too clever – see how quickly you can rectify this, and then think back as to how you would have done it before the advent of TABULATE!).

Getting it in

TABULATE is written without using any of those horrid "Commodore Graphics" symbols, so entering it should present few problems. However, there are some deeply nested functions, so count the brackets carefully! You may "crunch" the program if you want to by leaving out all the REM and spacing ("59990 :") lines. The program is numbered to let you do this without the danger of GOTO'ing a non-existent line.

Type in the program, and save it to disk or tape.

TABULATE is intended to be tacked on to the end of your own program, and is numbered accordingly. If you own an extended Basic or utility cartridge that gives you the MERGE or APPEND ability, then life is easy for you, and you can add it to existing programs using these means. If not, you will have to type TABULATE on to the end of existing programs each time.

For new programs, load TABULATE first, and then compose your program on top of it.

If the line numbers clash with existing lines in your own program, then renumber TABULATE accordingly but make sure you alter all the GOTO's and GOSUBS properly if you do.

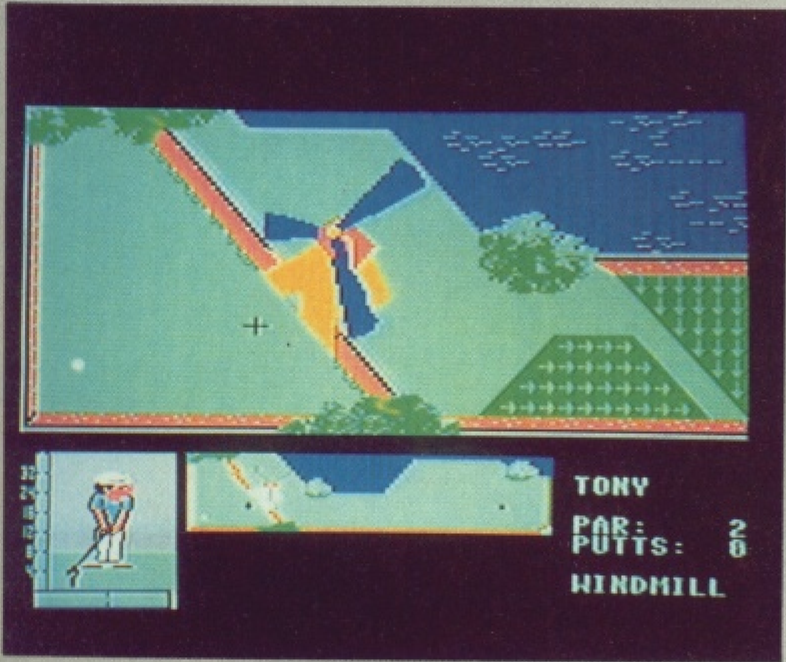
You must also check that the variables used by TABULATE do not clash with any in your own program. Tabulate uses:
CO,DD,DV,DL,FM$,JU,PE$,
PL,PZ,PX$,SI,SP$,TY,VE.

If you are in the habit of compiling your Basic programs, especially with PETSPEED, you may find that two-lettered variable names such as these cause strange things to happen. If this occurs, you will have to rename them as C1,D1 etc. I make no excuse for not doing this in the first place – most of the names were chosen either because they formed an easily remembered mnemonic (CO,TY etc) or were a bit strange and unlikely to be used by anyone else (DD,PZ etc).

See listing on page 91

Tabulate

Mini-Putt



Forget Leaderboard and forget Golf Construction set; this is the way golf is really played by millions on the world's crazy golf courses. Electronic Art's Mini-Putt contains four of the craziest courses to test your skill, courage and mental ability.

The game was written by Electronic Arts by Accolade who were the team behind games like Hardball, Killed Until Dead and Comics and other recent EA games – Test Drive and Apollo 18. All these games have one thing in common as they combine addictive gameplay with great graphics.

The Mini-Putt screen is divided into four sections. Two thirds of the screen shows a top down view of the hole being played including the ball and a cross that is positioned using the joystick to decide the direction of the shot. Below that is a picture of your mini-golfer with a speed and accuracy gauge, a map of the entire hole (since most holes are bigger than a single screen) and a record of shots taken and the par for the hole.

To take a shot you must line up the cross in the direction you wish the ball to travel in (you can move onto the other screens that make up the hole by moving the cursor off the side of the screen) which also changes the distance by the golfer. Pressing the fire button starts a bar moving up a gauge so that the release of the button determines the strength of the shot and also starts a bar moving over the accuracy gauge. This has a single line that you must stop the bar on by pressing the button since any error will mean you hit the ball off target. When you release the button the ball hopefully heads towards the hole.

That's the theory which should work everytime on a flat green. Unfortunately, this a crazy golf and theory takes a back seat as the courses are far from flat and contain a variety of obstacles put in your way from variable slopes to walls, bridges, an aeroplane, elephant, castle and even the Taj Mahal!

The four courses are given the misleading names of Deluxe, Classic, Traditional and Challenging which you'll soon rename to standard, curious, traditional and impossible. Each course consists of nine holes and can be played by up to four players who take their shots alternatively with the result of the preceding hole deciding the playing order. The holes vary from par one to three which often means that the player going first is used by the others as a guinea pig.

The Deluxe course is the easiest with the holes consisting of walled paths and a network of slopes that are marked by coloured areas with arrows showing the direction of the slope. This may look simple but it's not easy to pick a shot through a course littered with slopes. At the end of each hole the scores are displayed for each hole as well as the running totals and the par for the course so far.

The classic course is undoubtedly the best as it contains some of the hardest holes in Mini-Putt. Hole two is particularly difficult thanks to an elephant that's sitting right in the middle of the course. To complete the hole within the par three you have to time your first shot to avoid the elephant's trunk that will hit you into an impossible position, over a narrow bridge that spans a river, navigate through a series of slopes that will steer you back over the river, this time via a conveniently positioned boat, through a gap in a wall past the swishing elephants tale and into the hole!

The reward for completing the hole is a chance to fail on a traditional windmill before trying to get your ball past a revolving aeroplane propeller and then into a cannon that fires you over the walls that totally surround the hole. This course also features walls with small holes in them such as the ones in the castle wall that you must hit the ball in only to find that it doesn't re-appear in the obvious direction but in the worst possible place. There's one hole where the exit varies depending on how many players have passed through and anyone who tries to copy the success of a player before them will find themselves going backwards.

The traditional and challenge courses are back to the simple walls, water and slopes of the first course but these are arranged in such a way that you have to be exact with your shot's strength and direction and take your life in your hands just to break even. This is Mini-Putt at it's toughest as the slightest mistake could cost three shots. The on screen golfer will mimic your actions and will jump with joy if you sink a par or even a birdie or hole in one which is accompanied with a fanfare to impress the neighbours but he will stand sullenly over the hole if you go over par and break his club over his knee in disgust if the shot ends up in water.

Finally, two peices of advice. The first is printed on the packaging and advises you to remove any breakable objects so they don't get hurled across the room, and secondly if your opponent 10 putts a par three – don't laugh too loudly as it could happen to you on the very next hole.

A superb new twist to the Leader Board style of hit and hope golf game.

T.H.

Touchline:
Title: *Mini-Putt.* ***Supplier:*** *Electronic Arts, Langley Business Centre, 11-49 Station Road, Langley, Nr Slough, Berks SL3 8YN.* ***Tel:*** *0753 49442.* ***Machine:*** *C64.* ***Price:*** *£9.95.*

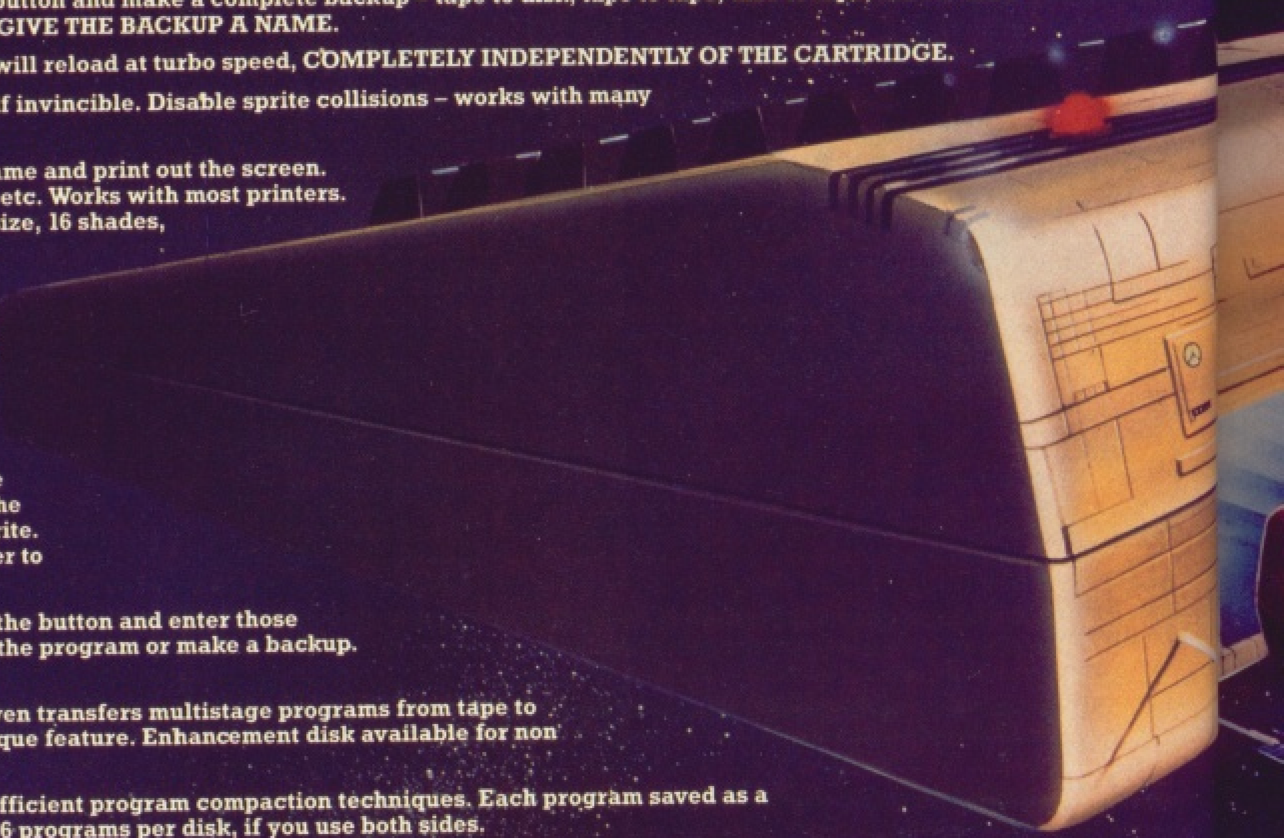
TOTAL BACKUP POWE
Now ACTION REPLA

NOW EVEN MORE POWERFUL, MORE FRIENDLY AND WI

ONLY £29·99 POST FREE

Action Replay works by taking a *'SNAPSHOT'* of the program in memory so it doesn't matter how the program was loaded – from tape or disk – at normal or turbo speed.

- **WARP 25. THE WORLD'S FASTEST SERIAL DISK TURBO – NOW EVEN FASTER! LOADS 200 BLOCKS IN 6 SECONDS! 240 BLOCKS IN 7 SECONDS!** – that's even faster than some parallel systems. Built int the cartridge – no extra hardware or software required. Includes supercast, warpsave, scratch, filecopy/convert. Integrated with normal disk turb for supercompatibility – auto detects warp or normal format so no special load commands are required. Turbo and Warp 25 speed are entirely independent of the cartridge with SUPERBOOT.
- **SIMPLE TO USE:** Just press the button and make a complete backup – tape to disk, tape to tape, disc to tape, disk to disk. THE PROCESS IS AUTOMATIC – JUST GIVE THE BACKUP A NAME.
- **TURBO RELOAD.** All backups will reload at turbo speed, COMPLETELY INDEPENDENTLY OF THE CARTRIDGE.
- **SPRITE KILLER.** Make yourself invincible. Disable sprite collisions – works with many programs.
- **PRINTER DUMP.** Freeze any game and print out the screen. Eg. loading picture, high score screen etc. Works with most printers. MPS 801, 803, Star, Epson etc. Double size, 16 shades, reverse print option. Very versatile – no user knowledge required.
- **PICTURE SAVE.** Save any Hires multicolour screen to disk at the push of a button. Compatible with Blazing Paddles, Koala, Artist 64, Image System etc.
- **SPRITE MONITOR.** Unique Sprite monitors allows you to freeze the action and view all the sprites, watch the sprite animation, save or delete any sprite. Load sprites from one game into another to make customised programs.
- **POKES/CHEAT MODE.** Press the button and enter those pokes for extra lives etc., then restart the program or make a backup. Ideal for custom games.
- **MULTISTAGE TRANSFER.** Even transfers multistage programs from tape to disk. The extra parts fast load – a unique feature. Enhancement disk available for non standard multi-loaders (see below).
- **SUPER COMPACTOR.** Ultra efficient program compaction techniques. Each program saved as a single file. 3 programs per disk side – 6 programs per disk, if you use both sides.
- **TEXT MODIFY.** Change title screens, high score screens etc. Put your own name into a game then restart it or make a backup to tape or disk. Very simple to use.
- **MONITOR.** Full feature 'Floating' type MACHINE CODE MONITOR. All standard features plus many more:- assemble, disassemble, hex dump, interpret, transfer, compare, fill, hunt, number conversion, bank switching, relocate, load/save etc. Uses no memory. Full printer support.
- **DISK MONITOR.** A special monitor for use on the RAM inside your disk drive. All the usual commands – a useful hacking tool.
- **WHOLE DISK COPY.** Copy a full unprotected disk in under two minutes with only one drive.
- **FAST FILE COPY.** Works with standard and Warp 25 files of up to 249 blocks. Converts formats to and from Warp 25.
- **FAST FORMAT.** Under 20 seconds.
- **TOOLKIT COMMANDS.** A whole range of useful new commands including: AUTO LINE NUMBERING, DELETE, MERGE, APPEND, OLD, LINESAVE, etc., PRINTERLISTER – list any program (including directory) directly from disk to printer or screen without corrupting memory.
- **REDEFINED FUNCTION KEYS.** Single stroke commands for operation of many common commands including: LOAD, SAVE, DIR. Load from directory – no need to type in filename.
- **TAPE TURBO.** Designed to make turbo load/save for your own programs. No screen blanking during loading.



REMEMBER all features are built in and available at the touch of a key. All features work with both **TAPE** and **DISK.** (Except multipart transfer & disk file utility).

ENHANCEMENT DISK

Contains routines for transferring many of the non-standard multi-load games from tape to disk. Over 40 titles. Latest additions are **LAST NINJA, ROAD RUNNER** (infinitive lives option), **BLOOD 'N' GUTS** (play any event), **DECEPTOR, LEADERBOARD EXEC** and **WORLD CLASS, KILLED UNTIL DEAD, MASK, INDIANA JONES, IMPLOSION, TAIPAN,** plus all the classics including **SUMMER GAMES, WORLD GAMES, DRAGONS LAIR** 1 and 2, **GAUNTLET, SUPERCYCLE** etc. Works in conjunction with **ACTION REPLAY.**

Disk includes **GRAPHIC SLIDESHOW** for displaying pictures saved with **ACTION REPLAY.** Plus Warp 25, Superboot – non Action Replay owners can speed up their 'expert' or 'freeze machine' programs to see what they have been missing.

ERTAKES A QUANTUM LEAP
AYMK IV HAS ARRIVED!

FOR CBM64/128

WILLBACKUP MORE PROGRAMS THAN ANY RIVAL UTILITY.

BUT THATS NOT ALL ... NOW AVAILABLE FOR THE SERIOUS PROGRAM HACKER

ACTION REPLAY IV 'PROFESSIONAL'™

● All the features of the normal Action Replay IV but with an amazing on board LSI LOGIC PROCESSING CHIP. Plus 32K operating system ROM and 8K RAM CHIP. The first RAM/ROM based cartridge of its type!



ALL THE MK IV FEATURES PLUS ...

● **FULLY INTEGRATED OPERATION.** The MK IV 'Professional' has all the features of the MK IV plus an onboard custom LSI LOGIC PROCESSING CHIP that integrates the whole range of utilities and makes them available at the press of a button at any time.

● **EXTENDED MONITOR.** The 'Professional' has an extra powerful machine code monitor. Because it has both ROM and RAM at its disposal the Professional can freeze any program and then examine the WHOLE OF COMPUTER MEMORY in its frozen state including screen RAM, ZERO PAGE and STACK.

Full feature disassembly, compare, fill, transfer, hunt, relocate, jump etc. etc. In fact all the features of the best fully blown monitor available. Return to the frozen program at the press of a key at the point you left it! An absolute must for the program hacker – or even the programmer who needs to de-bug his program.

● **INTELLIGENT HARDWARE.** The Professional hardware is unmatched anywhere in the world today. The special logic processing chip can cope with protection methods as they appear by reacting to its environment.

MK IV PROFESSIONAL ONLY £34·99 POST FREE

UPGRADE INFORMATION

MK III TO MK IV. Just send £9.99 and we will send you the new MK IV Chip to plug into your cartridge. Fitting is very easy.

MK III TO MK IV 'PROFESSIONAL'. Send your old cartridge plus £19.99 and we will send you a new Professional MK IV.

MK 2 Action Replay owners can get £10 as part exchange against either the MK IV or Professional. Send old cartridge plus balance.

PERFORMANCE PROMISE

Action Replay will backup any program that any other cartridge can backup – and more! It also has an unmatched range of onboard features. Before you buy check our competitors ads to see what they offer and see how many of the Action Replay MK IV features are either not there or have to be loaded from Supergate disks etc. When you buy Action Replay if you don't find our claims to be true then return it within 14 days for a full refund.

ALL ORDERS NORMALLY DESPATCHED WITHIN 48 HRS

HOW TO ORDER ...

BY PHONE	BY POST	EUROPEAN ORDERS
0782 273815 24 hr Credit Card Line	Send cheques/PO's made payable to 'Datel Electronics'	ADD £1.00 P+P **OTHER COUNTRIES** ADD £3.00 P+P Fax Orders 0782 264510

DATEL ELECTRONICS

UNITS 8/9, DEWSBURY ROAD, FENTON INDUSTRIAL ESTATE, FENTON, STOKE-ON-TRENT.

SALES ONLY	TECHNICAL ONLY
0782 273815	0782 202258

COLOSSUS MAHJONG

Mah Jong is an ancient Chinese game full of flowers, seasons, winds and dragons and packed with the mystery of the Orient. It is also the latest in the Colossus series of strategy games from CDS. If you've ever seen the Chinese playing Mah Jong at incredible speeds you may have noticed a blur of bamboo and ivory tiles covered in mysterious symbols. These symbols have now been transferred into C64 pixels that accurately display the suits and majors of Mah Jong.

Mah Jong is played with a set of 144 tiles that are shuffled (or washed or twittered) and built into a wall and then dealt to the four players who are known as East, West, North and South. The object of the game is to build up a complete hand of 14 tiles that consist of pungs (3 identical tiles), Kongs (4 identical tiles) and chows (a run of three tiles of the same suit) and a pair. You begin the game with 13 tiles and take it in turns to take a piece from the wall and then discard one. You can jump a turn by claiming a discarded piece for a pung or a kong but you can only claim a chow from a person playing before you.

This simple game system has prompted many to compare Mah Jong to the card game rummy but a few hands of Mah Jong will convince you that this offers a lot more. Each of the three Mah Jong suits (the bamboos, circles and characters) contains four tiles that range from one to nine so there can be a scramble if more than one player is going for the same pung. The two to nine of each suit are considered minor tiles and a pung of them is only worth two points whereas a pung in the major ones or nines is worth four points. The Mah Jong set also contains winds and dragons that are not only worth four points per pung but a pung of dragons or your own wind will double your score. There are also four flowers and seasons that correspond to the four players and will score a double if you get your own and three doubles if you get all four seasons or flowers.

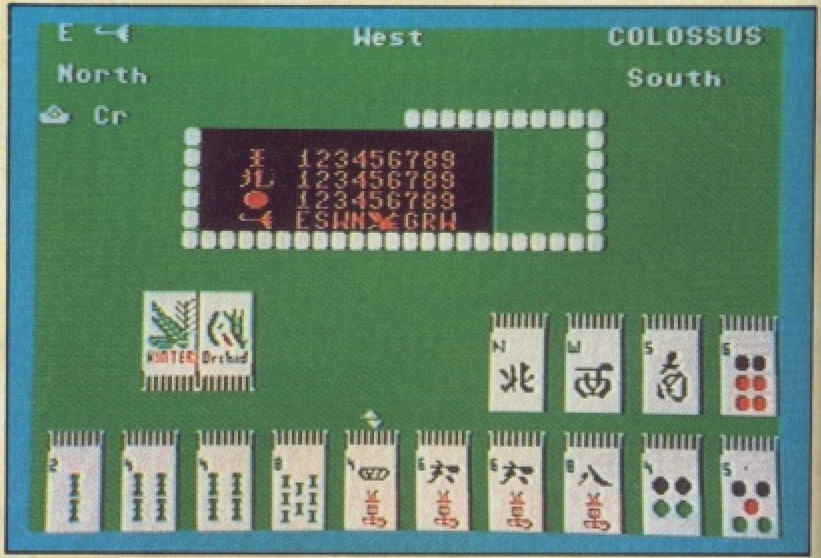
Two points for a pung and even with 20 points for going Mah Jong may not sound a lot, but through skillful play and the collection of pieces that give you doubles you can build a score worth hundreds or even thousands in a single hand! To add to the drama the player who is currently East pays and collects double his score when the totals are compared at the end of a hand.

To amass a really big score you should go for one of the special hands that can earn you 1000 points in a single hand. These hands have amazing names to match their value and the difficulty to create them, but should you collect buried treasure, four blessings hovering over the door, imperial jade or a gates of heaven you should enjoy it as it may be a long time before you see another one.

Colossus Mah Jong provides you with three computer opponents that can play at nine different skill levels and the inclusion of features such as 3D displays of the tiles, a grid in the centre of the screen that neatly displays the discarded tiles and the ability to turn on and off game components such as special hands and hidden discards to make the game as difficult or easy as you want.

A full game of Mah Jong consists of four rounds which contain as many games as necessary for each player to have a turn as East. This can often be more than four as East remains East if he goes Mah Jong. On the computer as in the real game this can take several hours but you can shorten this by only playing one or two complete rounds.

I have played Mah Jong for over ten years and have often wondered if it could or would be computerised and whether such a version would accurately display the pieces and include the special hands. Now CDS has done all that and added a tutorial program to introduce the pieces, and special hands so beginners can learn the game with patient computer opponents for the cost of a computer cassette or disk before spending £20-30 for a full set.



The gameplay although accurate can be quite slow but this is acceptable as Mah Jong isn't a game to be rushed. I found the screen display to be clear and accurate although a little difficult to distinguish between the five and six characters if you don't know Chinese patterns. Sound is kept to a minimum of bleeps whenever a player gets a flower or season or a pung or kong is claimed. Colossus Mah Jong is a highly playable and accurate version of the superb strategy game add to that nine computer opponents that will challenge all but the best players and you have a truly colossal program.

T.H.

Touchline:
Title: *Colossus Mah Jong.* ***Supplier:*** *CDS Software, CDS House, Beckett Road, Doncaster, South Yorkshire.* ***Tel:*** *0302 21134.* ***Machine:*** *C64.* ***Price:*** *£9.99 cass £14.99 disk.*

Bothersome Basic

Basic can benight or bemuse, but it can also be fun

By Norman Doyle

Before we can indulge ourselves in an artificially intelligent program, we still have to tackle arrays and data – probably the most avoided subjects in Basic programming.

I've already shown that a variable is simply a storage box for numbers, or for groups of letters and/or numbers, known as strings. These work well in most cases but what happens when you have a list of names that needs sorting out into alphabetical order?

Normally, you'd make a list of the names and then create a second list pulling out the names into alphabetical order. The computer can behave in a similar fashion but first it needs a list to work from.

When we make a list, the computer is notified by the word DATA:

```
10 DATA PETE, JEFF, JOHN,
FRED, FRAN, ALEX, ALAN
```

The computer now knows the names but needs to store them in some sort of numbered list so that it can juggle them around. For this we use the array.

An array is a series of variables having the name but with a qualifying number in brackets, for example:

A(255), A$(6), NAME$(1), NUMBER(22)

A small array, one using values from (0) to (9), can be created simply by using them in a program. A line stating something like XC(2)=21 automatically creates the X array with ten *elements* numbered from zero to nine inclusive.

Large arrays have to be *DIMensioned.* In other words, the computer has to be informed of the maximum number of elements which will be used. For example, DIM A$(32) will create a string of arrays with 33 elements; remember there is also A$(0). The largest, one dimensional array has 256 elements and would be set up by something like this:

DIM NAME$(255).

Arrays are ideal for use with DATA statements. One line of Basic can set up several variables instead of interminable equivalance statements, that is NA$(1)="PETE": NA$(2)= "JEFF" etc. In our sorting program we can set up the variables by READing the data as follows:

```
20 FORA=IT07:READ NA$
(A):NEXT
```

This replaces the long winded alternative which would take up an awful lot of memory with a dimensioned array of 256 elements, not to mention the boredom of typing it all in!

The purpose of this exercise is to show how the sort interacts with the array system so we need to print out the names in their original order as the array is set up:

```
20 FORA=ITO7:READ NA$(A):
PRINT NA$(A)"";:NEXT:PRINT
```

Run the program and you'll see a row of printed names which corresponds exactly with the order given in line 10.

Fortunately strings can be compared to each other using the *greater than* and *less than* symbols. Even names which are similar in spelling such as FRED and FRAN can be sorted in this way. FRAN will be treated as having a value which is less than that of FRED. Even a pair of names like GEORGE and GEORGINA can be separated into alphabetical order using one of these symbols.

In our program we want to compare two names and then swap their places in the array if the second name should precede the first one in alphabetical order. Using the first two data items, PETE obviously follows JEFF in an alphabetical list so a statement such as:

```
IF NA$(1)>NA$(2) THEN...
```

would be true and whatever followed the *then* statement would be executed.

The statement would close by exchanging the contents of NA$(1) with the contents of NA$(2). If we just said NA$(1)=NA$(2) we would change PETE to JEFF but both array variables would then be JEFF and PETE would be lost. We need to move PETE out of his variable into temporary storage, copy NA$(2) into NA$(1) and then bring PETE back out as NA$(2). You may have noticed that NA$(0) has not been used yet so here is an ideal temporary home for PETE:

```
IF NA$(2)>NA$(1)THEN NA$(0)=
NA$(1): NA$(1)=NA$(2):NA$(2)=
NA$(0)
```

This would be quite sufficient but PETE now needs to be compared to all other names before he finds his place. The use of variables gives us a new use for a loop:

```
30 FOR B=2T07
40 IF NA$(B-1)>NA$(B) THEN
NAS(0)=NA$(B):NA$(B)=NA$(B-1)
:NA$(B-1)=NA$(0)
50 NEXT B
60 FORC=1T07:PRINTNA$(C)"";
:NEXT:PRINT
```

Running the program will compare PETE to all of the names in the list.

Now we have to compare all the names by introducing a new loop using variable B:

```
30 FORA=1TO6:FORB=2TO7
70 NEXT A
```

Now the program is complete, a careful study of the screen print out of each series of exchanges will show how the sort program works. Remember that the name will only move if the word that follows it has a higher value.

Out of Tune

Don Benham of Warwick has written to say that he's having problems with the Piano Keyboard program on page 147 of the User Manual which is supplied with the C64. He writes:

'When I run this program I get ILLEGAL QUANTITY ERROR IN 310 and cannot seem to find what this error is. Also, when following the program through, I cannot see how it ever gets to line 800.'

Taking your final quandry first, you're quite right in thinking that lines 800 onwards are redundant. Whether it ever had any part in a longer version of this program or not, only Commodore can say.

I'm afraid that the main problem you have is one of your own making because the program almost runs correctly as printed in the manual. I say 'almost' because the programmer seems to have forgotten to switch the volume on! Add the following line to correct this omission:

```
275 POKE S+24,15
```

Now, back to your problem and how to track down faults. No matter how carefully you type in a program, faults seem to creep in. With an illegal quantity error this means that a value is being assigned to a variable which is too high for the purpose for which you're using it. The offending line looks like this:

```
310  FR=F(K(ASC(A$)))/M:T=V
*7:CR=S+T+4:IF FR=Z THEN 500
```

With so many variables around how do you find the troublesome one?

The answer is to use the STOP command. Place it after each term in turn until the error message appears. Then you'll know which formula is faulty, but you don't know which variable. Suppose it turns out to be the first one:

```
FR=F(K(ASC(A$)))/M
```

It is unlikely that ASC(A$) is wrong because it evaluates a keypress which couldn't possibly be greater than 255. Similarly if the value it gives is out of the range given in the program's DIM commands a BAD SUBSCRIPT error would result. This rule also means that F(K(ASC$(A$))) is not wrong, otherwise you'd get the same subscript error.

The only one left is M so check back elsewhere in the program to see if any of those statements using M could be wrong.

If this part of the line is the one causing the problem, similar detective work will reveal your error.

Of all the complaints about faulty listings in *Your Commodore*, 99% can be traced back to typing errors which the errant typists refuse to accept is their fault. Always check, double check and, if necessary check again. We'll be looking at debugging in later editions of Bothersome Basic but it all boils down to logic in the end.

Deep Enders may wonder where their pearl of wisdom is this month. Next month we have a super artifical intelligence program which means you'll get a double helping of information, so order your magazine now!

I regret that I cannot answer your problems by phone but if you have any queries about Basic routines or about these articles, please send them to Borthersome Basic, Your Commodore, No 1 Golden Square, LONDON W1R 3AB enclosing an s.a.e. and any relevant printouts or recordings.

OFFICIAL COMMODORE/AMIGA DEALER

COMPUTERS	
Amiga 2000 System Unit	929.00
Amiga 2000 + 1084 Colour Mon	1189.00
Amiga 2088 PC/XT Bridgeboard + 5.25" Disk Drive	458.85
Amiga 2052 2Mb Ram Card	378.35
Amiga 500 + dPaint + MORE!	459.00
Amiga 500 + Philips 8833 Stereo Colour Mon*	699.00
Commodore 128/C2N/3 Tapes/Joystick/Games	219.00
Commodore 64C/C2N/3 Tapes/Joysticks/Sports Bag/Games	159.00
PRINTERS	
OKIMATE 20 TEXT & MULTI-COLOUR GRAPHICS FOR AMIGA	199.00
Star LC10 Parallel 120/30cps	199.00
Star LC10 C64/128 120/30cps incl lead	199.00
Star LC10 Parallel COLOUR	PHONE
Star LC10 C64/128 COLOUR incl lead	PHONE
Citizen 120D Parallel 120/25cps	165.00
Citizen 120D C64/128 120/25cps incl lead	165.00
MONITORS	
Commodore 1802 Colour Mon for C64	189.00
Philips 8833 Stereo Colour Mon	249.00
Philips BM7502 Green Mon inc lead	82.00
Philips BM7522 Amber Mon inc lead	94.00
MISCELLANEOUS	
Amiga 520 TV Modulator	24.99
Amiga 501 512K RAM Expansion + Clock	99.95
Commodore 1541C Disk Drive + Software	159.00
Commodore 1571 Disk Drive	189.00
Commodore 1581 3.5" Disk Drive	189.00
Commodore C2N Data Recorder	29.95
Cumana CAX354 Amiga Disk Drive	129.00
Power Supply for C64	26.45
Super-G Cent Interf + Graphics	34.95
Surge Protector 4 x 13A Distrib Block	18.95
Amiga DOS Ref Manual (2nd Ed) (p&p £2)	22.95
C128 Official Prog's Ref Guide (p&p £2)	18.95
Addison-Wesley Amiga Ref Manuals	PHONE
SOFTWARE (Examples)	
Amiga Scribble 2	79.00
Amiga The Works! (Scribble + Analyze + Organise)	139.00
Amiga Superbase	86.95
Amiga DigiView	153.00
Superbase 128 Programable Database	29.95
Superscript 128 Word Processor	29.95
Tasword 64 40/80 Col WP - Tape/Disk	17.95/19.95
Vizawrite with Spelling Checker	59.95

ALL PRICES INC. VAT. CARRIAGE £8. EXPRESS DELIVERY £12
Software & Small items FREE

Delta Pi Software Ltd

8 Ruswarp Lane, WHITBY, N. Yorks. YO2 1ND.
Tel: 0947 600065 (9am-7pm)

I·C·P·U·G

the Independent Commodore Products Users Group is the largest and most friendly computer club in the country

Back issues for 1987 available to non-members as well as members, at £1.50 each, postage paid.

- Many local groups with regular meetings
- Superb FREE Newsletter - 80 plus pages of reviews, news and information every two months
- We support all Commodore Machines old and new: PET, VIC20, 64, 16, +4, PC, 128 and AMIGA . . .
- Free Software Library of public domain programs for all the above machines available to members on supply of blank disk or tape and payment of p&p
- Help and Advice
- Discount scheme
- Subscription only £10 per year (UK) plus £1 joining fee

If you are seriously interested in using or programming any Commodore computer, then joining ICPUG is a must!

For full details, send a stamped, addressed envelope to:

ICPUG Membership Secretary, Jack C. Cohen,
30, Brancaster Road, Newbury Park,
Ilford, Essex, IG2 7EP

Commodore Modem Revealed

Why suffer the deficiencies of commercial software for your modem when you can write your own?

By S. Henderson

The Commodore modem is used by many people for accessing the *Compunet* database, *Prestel* and bulletin boards. When using the modem most people use software provided by one of the services mentioned, never dreaming that they could write their own software which would make the modem far easier to use.

This article will describe how you can make the modem work other than under *Compunet*, viewdata, or teletype software. The modem can only handle 1200 baud reception but can transmit at 75 baud, or 1200 baud. This means that it can receive around 120 characters per second, and transmit at either 120 characters per second or at 75.

Due to limitations of the hardware, when 1200 baud is being used for transmission, no reception can occur. This is why those of you who have used half-duplex *Compunet* access numbers will have seen the arrow showing the direction the data is travelling. Half-duplex only lets information go one way, whereas full-duplex lets data go in both directions at the same time if required. Full-duplex is used for normal *Compunet* and *Prestel* access at 1200/75.

The Commodore modem is extremely versatile. It has various types of parity (error-checking) built in, and can quite easily be programmed by the user, with the necessary know-how and technical information, much of which will be covered in this article.



Accessing the Registers

Many of the modem's internal registers (memory locations) are accessed by POKEing memory location 56832 with the number of the register that you wish to access, and either POKEing or PEEKing location 56833 with or for the information to be sent to or retrieved from the modems register.

It is worth pointing out that in machine code, interrupts must be disabled when the modem is being used. Also when reading memory location 56833, due to a timing problem, the LDA/LDX/LDY instruction must be given twice.

In Basic, no problems are experienced as the commands will be performed much slower.

Details of the modem's registers are shown in figure 1. All of them are used to control the modem when accessing information from the telephone.

Jump Tables are used to access useful routines that control the editor, read frames from *Compunet* among other things. Information is given on some of the more useful of these.

All of these routines are called from Basic with a SYS command. You should use JSR when using machine code.

ADDRESS	
33024	'RE-CONNECT' after the OFF command has been used.
33027	Access the EDITOR.
33030	Perform the CONNECT command.
33072	Create a new EDITOR frame.
33066	Put current screen display into the editor (use above call BEFORE this one).
33069	Send current EDITOR frame to a Commodore printer.
33075	Perform the EDITOR 'LAST' command.
33078	Perform the EDITOR 'NEXT' command.
33081	Perform the EDITOR 'GET' command.
33084	Perform the EDITOR 'DOS' command.
33096	Wait for a key after prompt.
33099	Wait for a key.
38592	Reset the modem and initialise variables.

Auto-dialling

The auto-dialling features of the modem are fairly powerful. The program at the rear of the magazine will automatically dial a number, or get a name from the DATA statements, and then engage in user to user chat.

The F1 and F3 keys are used to swap between who is sending and who is receiving, and the F7 key will drop the line. Note that if only one end presses F7, the line will still be connected for the other person, unless he keys F7.

The RUN/STOP key is NOT disabled, so do not press it when using this program, or the modem will remain on line. To stop this, use the modem RESET command: (POKE56832,3:POKE56833,32)

This article should have whetted your appetite just enough for you to start writing your own software for your Commodore modem. YC

See listing on page 90

Figure 1 – The Registers

Register 0 – STATUS – READ ONLY

Bit 7	LTXRDY	Ready to transmit
Bit 6	LRDRDY	RXed data available
Bit 5	LDCD	2 sec. carrier detect
Bit 4	LFERR	Framing error
Bit 3	LPERR	Parity error
Bit 2	LIDCD	0 sec. carrier detect

Register 2 – MODE – READ/WRITE

Bit 7	LPO/E	Parity hi = odd low = even
Bit 6	LPEN	Parity hi = off low = on
Bit 5	751200	TX baud hi = 1200 low = 75

Register 3 – COMMAND – READ/WRITE

Bit 7	LRXEN	Receive enable
Bit 6	LTXEN	Transmit enable
Bit 5	RESET	Set to reset, cleared when complete
Bit 4	LDBEN	Demodulator output buffer enable

Register 4 – LINE RX/TX – READ/WRITE

READ DATA BYTE RECEIVED
WRITE – DATA BYTE TO TRANSMIT

Register 6 – CONTROL PORT – READ/WRITE

Bit 2	TXFILT	TX baud filter Hi = 75
Bit 0	SEIZE	Seize line

Register 8 – DIAL & TIMERS – READ/WRITE

Bit 7	UK/EUR	UK/European dialling EUR is low, UK is high
Bit 6	60SEC	60 sec. timer, set to start, cleared when complete
Bit 5	DIALGO	Set to start dial, cleared when digit is dialled
Bit 4	1.5SEC	1.5 sec. timer, like bit 6 but shorter
Bits 3.0	DIGIT TO DIAL	WRITE ONLY Use $OA # 10 for 0

Evesham Micros

ONLY £99.95 inc. VAT



STOP! STOP! STOP!
Why pay more?

We can supply you this ultra neat, high quality Amiga 2nd drive for an ultra low price

FEATURES
- One year guarantee
- 880K formatted capacity
- Very quiet
- Slimline styling
- Throughport
- Fully compatible
- Suits A500 or A1000
- Top quality Citizen drive mechanism
- Long cable for location left or right of computer

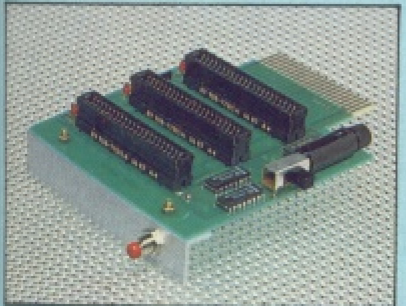
All prices VAT/delivery inclusive. Next day delivery £5.00 extra.

How to order
Send cheque P.O. or ACCESS/VISA details
Phone with ACCESS/VISA details
Govt., educ. & PLC official orders welcome
Same day despatch whenever possible
Callers welcome, open 6 days 9.30-5.30
All offers subject to availability, E.&O.E.
TELEX: 333294 FAX: 0386 765354

Evesham Micros
63 BRIDGE STREET
EVESHAM
WORCS WR11 4SF
Tel: (0386) 765500

ALSO AT: 1756 PERSHORE RD., COTTERIDGE, BIRMINGHAM, B30 3BH TEL: 021 458 4564

DATEL ELECTRONICS



3 SLOT MOTHERBOARD

Save wear and tear on your Expansion Port

- Accepts 3 cartridges.
- Onboard safety fuse.
- Switch in/out any slot.
- High grade PCB.
- Fully buffered.
- Reset button.

ONLY £16.99

DATA RECORDER

- Quality Commodore compatible data recorder.
- Pause control.
- Suitable for 64/128.
- Counter.
- Send now for quick delivery.

ONLY £24.99



SMART CART ™

Now you can have an 8K or 32K cartridge that you program like RAM then acts like ROM!

- 8K or 32K pseudo ROM.
- Battery backed to last up to 5 years (lithium battery).
- Simply load the program you require – then flick the switch. The cartridge can then be removed just like a ROM cartridge.
- Make your own cartridges including autostart types – without an EPROM burner.
- Can be switched on or off board via software.
- I/O 2 slot open for special programming techniques.
- 32K version has 4 x 8K pages.
- Some knowledge of M/C is helpful – but full instruction are provided.

8K VERSION £14.99
32K VERSION £29.99

SMARTCART UTILITIES

A series of utility programs for use with Smartcart. Simply load in the program and you have a powerful cartridge. When you have a different requirement – load in another program and you have a new cartridge. The process takes seconds, and can be repeated any number of times.

We intend to release a range of programs. The first available are:

DISKMATE II

- all the features of Diskmate II (see ad).

Loaded in seconds – with full instructions. **ONLY £9.99**



PRINTER IV

Now you can turn your MPS 801 into 4 printers in one!!

- Alternative character set ROM – fitted in seconds.
- All four sets have true descenders.
- 100% compatible with all software.
- Descender.
- Eclipse.
- Scribe.
- Future.
- Choose any set at the flick of a switch.

"For anyone who uses their printer often this chip is a must. It's quick and easy to use and the end results are impressive" – Your Commodore, Jan 87.

ONLY £19.99

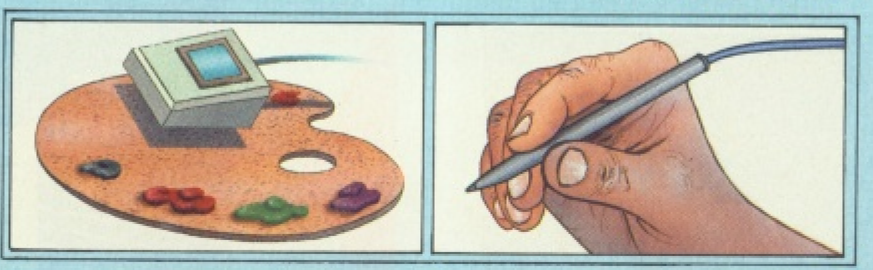


TURBO ROM II

Turbo Rom II is a replacement for the actual kernal inside your 64. It provides superfast load/save routines.

- Loads most programs at 5-6 times normal speed.
- Saves at 5-6 times normal.
- Improved DOS support including 10 sec format.
- Programmed function keys:- load, directory, old, etc.
- Return to normal kernal at flick of a switch.
- FCOPY – 250 block file copier.
- FLOAD – special I/O loader.
- Plus lots more.
- Fitted in minutes – no soldering usually required. (On some 64's the old ROM may have to be desoldered).

ONLY £14.99



BLAZING PADDLES

A complete lightpen/graphics illustrator package.

- A fully icon/menu driven graphics package of a calibre which should cost much more.
- Complete with a fibre optical lightpen system for pin point accuracy.
- Multi feature software including:
  - Range of brushes ● Airbrush ● Rectangle ● Circle ● Rubberbanding ● Lines ● Freehand
  - Zoom mode ● Printer dump ● Load/save ● Advanced colour mixing – over 200 hues!!
  - Cut and paste allows shapes/windows/pictures to be saved to/from tape/disk.
- Blazing Paddles will also work with many other input devices including; Joysticks, Mice, Graphics Tablets, Trackball etc.
- Pictures can be saved from Action Replay and edited with Blazing Paddles.

Complete Blazing Paddles & Lightpen **ONLY £24.99**

Blazing Paddles available separately for **£12.99**

TOOLKIT IV

The ultimate disk toolkit for the 1540/1541

- A disk toolkit is an absolute must for the serious disk hacker. Toolkit IV has more features than most for less.
- DISK DOCTOR V2 – Read and write any track and sector including extra and renumbered tracks. Repair damaged sectors. Look underneath read errors.
- HEADER/GAP EDITOR – Decodes and displays ALL header information including off bytes and header gap. Rewrite the entire header and header gap. Renumber sectors. Also edit any sector tail gap.
- DISK LOOK – Sort directory. Recover lost files. Display file start/end addresses. Disassemble any file program directly from the disk to SCREEN or PRINTER including undocumented opcodes. Edit Bam. Much, much more.
- FILE COMPACTOR – Can compact machine programs by up to 50%. Saves disk space. Compacted programs run as normal.
- FAST DISK COPY – Copy an entire disk in 2 minutes or less using single 1541.
- FAST FILE COPY – Selective file copy. Works at up to 6 times normal speed.
- FORMATTER – 10 second format an entire disk or format any individual track or half track 0 to 41. Redefine any of 30 parameters to create or recreate unique disk formats.
- ERROR EDIT – Quickly find and recreate all read errors including extra and renumbered tracks or sectors and half tracks from 0 to 41. Even recreates data under errors and allows you to redefine any necessary parameters.

ONLY £9.99

RAM DISK

- Turn your Smart Cart into a 32K RAM/disk.
- 32K of instant storage area for files/programs.
- Load/save instantly.
- Disk type commands: load, save, directory, scratch.
- Program data retained when computer is switched off!
- Full command set with instructions.

ONLY £9.99

ROBOTEK 64

Model & Robot Control made easy

- Robotek 64 is a comprehensive hardware/software package which enables you to connect your 64/128 to the outside world.
- 4 output channels – each with onboard relay
- 4 input channels – each fully buffered TTL level sensing.
- Analogue input with full 8 bit conversion.
- Voice input for voice control.
- Software features:- test mode/analogue measurement/voice activate/digital readout etc.
- Excellent value! **ONLY £39.99**

including hardware/software/mic etc. (State tape or disk)



DIGITAL SOUND SAMPLER

- The new sampler allows you to record any sound digitally into memory and then replay it with astounding effects.
- Playback forwards/backwards with echo/reverb/ring modulation etc.
- Now with full sound editing module to produce outstanding effects.
- Full 8 bit D to A and ADC conversion.
- MIDI compatible with suitable interface. (I.e. Datel unit for £29.99, see ad).
- Live effects menu includes real time display of waveforms.
- Line in/mic in/line out/feedback controls.
- Powerful sequencer with editing features.
- Load/save sample.
- Up to 8 samples in memory at one time.
- Tape or disk (please state).
- Complete software/hardware package **£49.99**
- Com-Drum software is available separately at **£9.99** to turn your Sampler II into a Com-Drum system as well as a sampling system.



COM-DRUM

Digital Drum System

- Now you can turn your computer into a digital drum system.
- Hardware/software package.
- 8 digital drum sounds in memory at one time.
- Complete with 3 drum kits.
- Real drum sounds – not synthesised.
- Create superb drum rhythms with real and step time.
- Full editing.
- Menu driven.
- Output to hi-fi or through tv speaker.
- Load/save facilities.

ONLY £29.99 (state tape or disk)

COM-DRUM EDITOR

- 24 drum sounds supplied on disk to enable you to construct your own drum kit.
- Re-arrange sounds supplied with a Com-Drum to make new kits.
- With sound sampler hardware you can record your own kits.
- Load/save facilities.

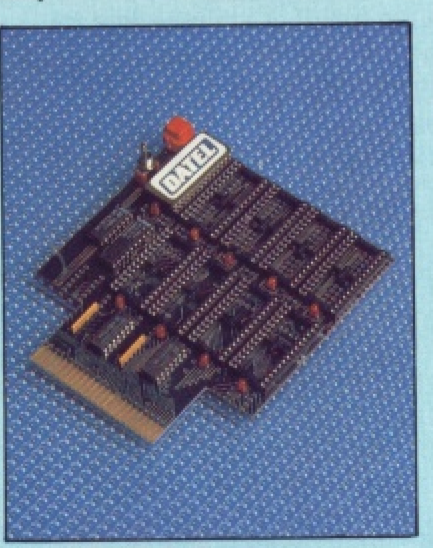
ONLY £4.99 disk only

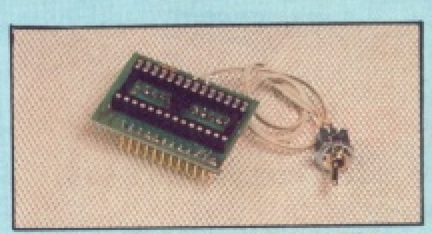
DATEL ELECTRONICS

256K SUPEROM EXPANDER

- ❑ Now you can select from any of 8 32K EPROMs instantly.
- ❑ 8 sockets to accept upto a 32K EPROM in each.
- ❑ On board operating system – no programs to load.
- ❑ Program your own EPROMs using our EPROM programmer.
- ❑ No need to have loads of cartridges – just make a selection from the Superom menu.
- ❑ Directory of utilities on power up.
- ❑ Fully menu driven on power up.
- ❑ Select any slot under software controls.
- ❑ Unique EPROM generator feature will take your own programs – basic or m/c and turn them into autostart EPROMs. (EPROM burner required).
- ❑ Accepts 2764/27128/27256 EPROMs.
- ❑ On board unstoppable reset.

ONLY £29.99



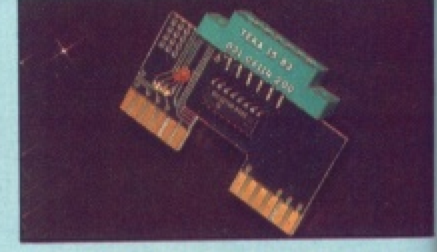


4 WAY KERNAL BOARD

- ❑ This board fits in place of the kernal in your 64 and accepts a 16K or 32K replacement kernal giving 2 or 4 different operating systems.
- ❑ Just flick the switch supplied to select between systems.
- ❑ This is a carrier only – ready to accept your own chip.
- ❑ Now you can have all your different systems available at one time.

ONLY £8.99

5 WAY BOARD **ONLY £12.99**



CLONEMASTER™

- ❑ Makes tape to tape back-ups.
- ❑ Works with even Turbo Loaders etc.
- ❑ Requires access to two CBM type data recorders.
- ❑ Makes perfect copies.
- ❑ Very simple to use.
- ❑ LED level indicator.

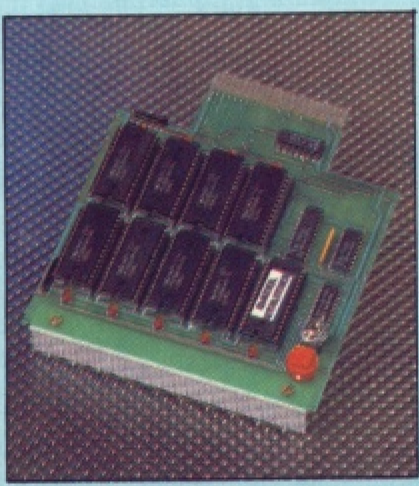
ONLY £9.99 POST FREE



RESET CARTRIDGE

- ❑ Unstoppable reset button.
- ❑ Resets even so called "unstoppable" programs.
- ❑ Add pokes from magazines etc.
- ❑ Fits in cartridge port.
- ❑ Simply plug in.

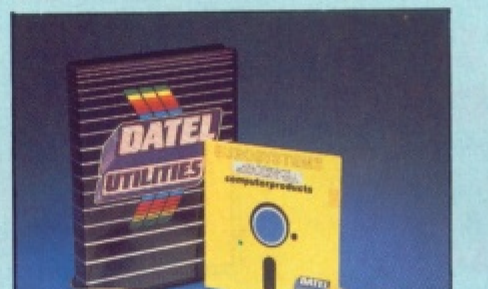
ONLY £5.99



DUPLIKATOR™

- ❑ Copies whole disk in one pass – only one drive required!
- ❑ Makes back-up copies in eight seconds!!
- ❑ Duplikator is the fastest, most efficient and easiest to use disk copying system ever conceived.
- ❑ Comes complete with 256K on-board ram and it's own operating system – no software to load.
- ❑ Makes multiple copies from one original.
- ❑ Full disk verification during back-up process.
- ❑ Copies standard software as well as errors 21-29 and upto 40 tracks.
- ❑ Full disk error check in eight seconds.
- ❑ Full disk verify against ram in fifteen seconds.
- ❑ A must for clubs, user groups etc. How else can you copy over 250 disks and hour for less than £100.
- ❑ Comes complete with on/off switch and reset button.
- ❑ Fitted in minutes – no soldering usually required.

ONLY £89.99



DEEP SCAN BURST NIBBLER™

❑ The most powerful disk nibbler available anywhere, at any price!

❑ Burst Nibbler is actually a two part system – a software package **and** a parallel cable to connect the 1541/1570/1571 to 64/128 (state type).

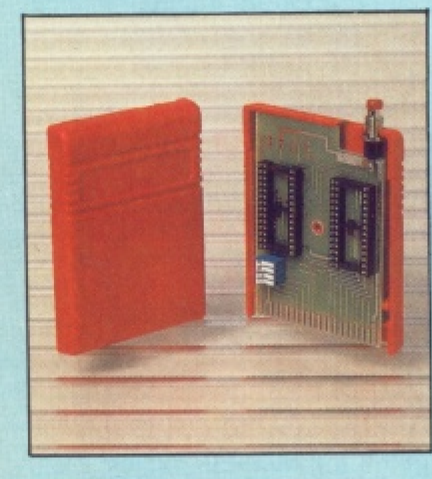
❑ What gives Burst Nibbler its power? Conventional nibblers have to decode the data from the disk before it can transfer it using the serial bus – when non standard data is encountered they are beat. Burst Nibbler transfers data as raw GCR code via the parallel cable without the need to decode it so you get a perfect copy of the original.

- ● Will nibble upto 41 tracks.
- ● Copy a whole disk in under 2 minutes.
- ● Full instructions.
- ● Regular updates – we always ship the latest.
- ● Fitted in minutes – no soldering usually required.
- ● Full or ½ tracks.
- ● No need to buy parallel cable if you have Disk Demon/Dolphin etc.
- ● Cable has throughbus extension for other add ons.

❑ Whether to choose FastHack'em or Burst Nibbler? Fast Hack'Em is unbeatable value as an "all-rounder" – with nibblers, 1 or 2 drive copy, format, file copy, 1571 copy etc. etc., so if you have a more general requirement perhaps FastHack'Em is for you. Burst Nibbler is a pure nibbler second to none, for the reasons stated. So if it's just making backups you are interested in, there is no other product to beat it.

ONLY £24.99 COMPLETE

SOFTWARE ONLY £12.99 CABLE ONLY £14.99



16K EPROM BOARD

- ❑ Accepts 2 x 8K EPROMs.
- ❑ Switchable to configure as 2 x 8K or 16K or off.
- ❑ On board unstoppable reset.
- ❑ Full instructions.

ONLY £8.99

DISK NOTCHER

- ❑ Quickly and easily double your disk capacity.
- ❑ Use both sides of your disks.
- ❑ Simple to use.
- ❑ Takes seconds.

ONLY £4.99

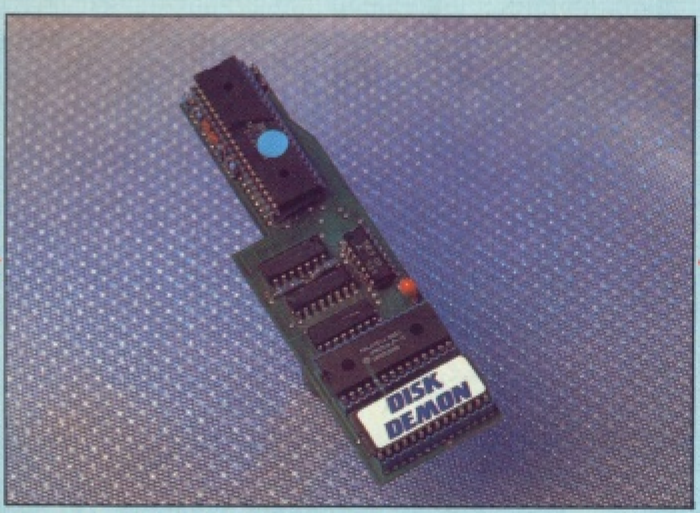


EPROMMER 64™

- ❑ A top quality, easy-to-use EPROM programmer for the 64/128.
- ❑ Fully menu driven software/hardware package makes programming/reading/verifying/copying EPROMs simplicity itself.
- ❑ Will program 2716, 2732, 2764, 27128 and 27256 chips. 12.5, 21 or 25 volts.
- ❑ Fits into user port for maximum compatibility with cartridges/Superom Board etc.
- ❑ Full feature system – all functions covered including device check/verify.
- ❑ We believe Eprommer 64 is the most comprehensive, most friendly and best value for money programmer available for the 64/128.
- ❑ Ideal companion for Superom Board, Cartridge Development System, our kernal expanders or indeed any EPROM base project.
- ❑ Comes complete with instructions – plus the cartridge handbook.

ONLY £39.99 COMPLETE

DATEL ELECTRONICS



PROFESSIONAL DOS ® MIKROTRONIC

£64.99 POST FREE with Disc Demon operating system

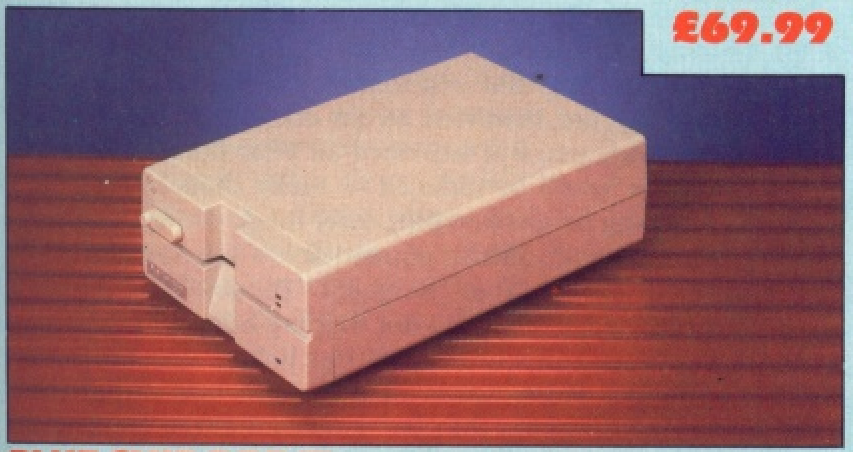
"The world's fastest parallel operating system"

- ❑ Loads a typical 202 block program file in under 3 seconds!
- ❑ 60x faster load (PRG files).
- ❑ 25x faster load (SEQ files).
- ❑ 20x faster save (PRG files).
- ❑ 20x faster save (SEQ files).

PLUS AN ADVANCED COMMAND STRUCTURE INCLUDING:

- ❑ Fast format – up to 40 tracks (749 blocks).
- ❑ 16 function keys: list, run, load, directory, format, save, old, verify, etc.
- ❑ Fload will fastload files up to 250 blocks (other similar systems will only cope with 202 blocks).
- ❑ Number conversion. ❑ Reset.
- ❑ Unique built in file copier will copy files up to 250 blocks like lightning – multiple copy options – perfect for copying Action Replay files.
- ❑ Highly compatible with commercial software – can be switched out for non compatible programs.
- ❑ Perfect for use with Action Replay 3 – a typical AR3 backup will reload in about 3 seconds – yes 3 seconds!
- ❑ Speeds up other DOS functions including verify, scratch etc.
- ❑ Comes complete with superfast file and whole disk copier free!
- ❑ Screen on or off during loading.
- ❑ Enhanced command set – over 30 new commands.
- ❑ Easily fitted – Disk Demon plugs inside the 1541 and the new operating system chip plugs inside the C64/128. Fitting takes only minutes and usually requires no soldering.
- ❑ User port throughbus supplied free – you could pay £15.00 for this alone.
- ❑ Supplied complete – no more to buy.
- ❑ Works on C128/1541 in 64 or 128 mode.

C128 version £69.99



BLUE CHIP DRIVE

● **Fully C64/128 compatible.**

- ❑ At last a top quality drive at a sensible price.
- ❑ Super slimline case
- ❑ External power supply for cool operation.
- ❑ Direct drive motor.
- ❑ Supplied complete with all cables – no more to buy.
- ❑ This drive is now probably the most compatible drive available for the Commodore. More so than even Commodores own '1541C. Much more so than other so called compatibles. In fact we have been unable to find a program including the latest that would not work. (At time of Press).
- ❑ **No need to look elsewhere – this is the best.**

ONLY £139.99 POST FREE
(If you require courier delivery add £5.00).

ULTRA CRUNCHER

● **The ultimate cartridge based program compactor.**

- ❑ Compacts by upto 30%!
- ❑ More programs for disk.
- ❑ 3 compacting programs on one cartridge.
- ❑ Fast loading/saving routines – works with Disc Demon.
- ❑ Can even further compact AR III files!
- ❑ 250 block file copy function.
- ❑ Full DOS support including fast format.

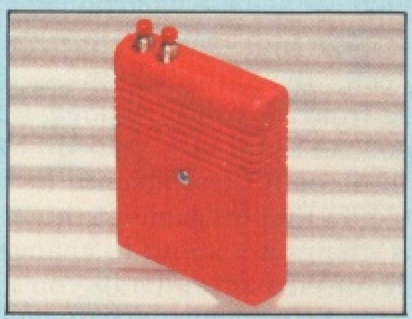
ONLY £12.99 on cartridge.
Available as chip only for 256K Superom Board for only £7.99

FAST HACK'EM ™

● **Multi Module Disk Nibbler – all on one disk.**

- ❑ Single 1541 Nibbler – Copy a disk in 2 minutes.
- ❑ Auto Nibbler – Copy an entire protected disk in 3 minutes.
- ❑ Super fast File Copy – Under 9 seconds typically.
- ❑ Copes with Fat Tracks.
- ❑ Superfast Copy – Entire disk in 36 seconds with verify.
- ❑ Twin Drive Copier – Even faster!
- ❑ Plus unique "Parameters" mode. These files "Unlock" the more heavily protected programs with a parameter for a particular brand or even single program.
- ❑ **No other product is such a good "All Rounder" at this price its unbeatable.**

ONLY £9.99 POST FREE

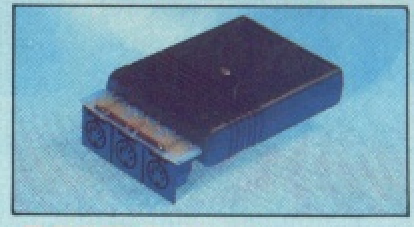


DISKMATE II

The Disk Utility Cartridge

- ❑ Disk fastload cartridge.
- ❑ Up to 5 times faster.
- ❑ Fast save. ❑ Fast format (10 secs).
- ❑ Improved DOS – single stroke commands – load/save/dir/old etc.
- ❑ Redefined function keys for fast operation of common commands.
- ❑ Powerful toolkit commands including: old/delete/merge/copy/append/autonum/linesave etc.
- ❑ Plus a full machine code monitor – too many features to list but it has them all!
- ❑ Special switching techniques make Diskmate invisible to the system. Therefore it is a more compatible fastloader than other types.
- ❑ Diskmate II is

ONLY £14.99

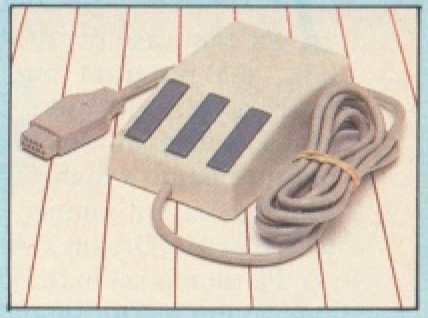


MIDI 64

A Full Midi Interface for the 64/128 at a realistic price

- ❑ MIDI in. ❑ MIDI thru. ❑ 2 x MIDI out.
- ❑ Compatible with most leading software packages including: Seil, JMS, Advanced Music System, Joreth, Steinburg etc.

ONLY £29.99



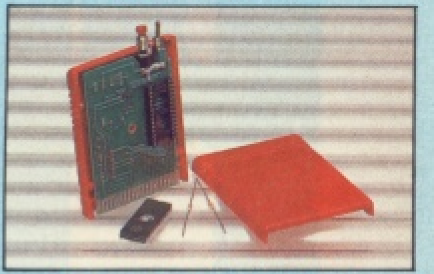
MOUSE

- ❑ CBM 64/128 mouse.
- ❑ Wide compatibility with software including: Blazing Paddles.
- ❑ Works by mimicking joystick so will work in any joystick application including graphic packages only designed for joystick.
- ❑ Functions on either joystick port.
- ❑ Optical system operation.

ONLY £24.99

CHIPS

- ❑ 27128 **£3.00 EACH**
- ❑ 27256 **£4.50 EACH**



CARTRIDGE DEVELOPMENT SYSTEM

- ❑ All the necessary parts to produce an 8K/16K auto-start cartridge.
- ❑ Top quality PCB. ❑ Injection moulded case.
- ❑ Reset switch. ❑ 16K EPROM.
- ❑ "Cartridge Handbook" gives full details and tips on building and configuring the cartridge for many uses.

ONLY £12.99
complete with handbook

ALL ORDERS NORMALLY DESPATCHED WITHIN 48 HRS

HOW TO ORDER . . .

BY PHONE	BY POST	BY PRESTEL/FAX
0782 273815 24 hr Credit Card Line	Send cheques/POs made payable to 'Datel Electronics'	Prestel Pages # 258880000A Fax Orders 0782 264510

DATEL ELECTRONICS

UNITS 8/9, DEWSBURY ROAD, FENTON INDUSTRIAL ESTATE, FENTON, STOKE-ON-TRENT. TELEX:

SALES ONLY	TECHNICAL ONLY
0782 273815	0782 202258

The first casualty of war is innocence – the first line of the box, the program and it ends the introduction in the instruction book and it's also from the award winning film Platoon. Not another game-of-the-film I hear you cry! Not another game which bears little or no resemblence to the film that gave it's name. Until now the best game-of-the-film was Electric Dream's Aliens, things are about to change.

Platoon is set in the jungles of Vietnam and stars you as a raw young recruit in a Platoon of five that's deep in enemy territory. You are totally unprepared for action and are destined to become another casualty statistic. In your early games this will happen quickly in the jungle or the village but later you may even survive to tackle the tunnel network and bunker of part two and then the second jungle and finally a duel for a foxhole and cover just minutes before a napalm air raid.



PLATOON

The three sections are loaded in separately from tape and you must survive one to start the next. The game begins as you and your patrol of five enter a Vietnamese jungle.

The jungle forms a sideways scrolling maze that patrol must enter to find a pack of explosives that have been left by a previous patrol. Although there are five in the patrol you can only control one at a time but can swap freely between them by selecting them from a menu accessed by pressing a function key. Each man begins the game with a full complement of machine gun bullets ad a bagful of grenades. As they are shot at and blown up they will suffer hits and if they get four hits then they're reported as being killed in action.

Deep in the jungle you'll find some explosives that you will need later and you may even find some medical supplies to heal hits and ammunition and grenades on the corpses you create. When you find a bridge you must be quick to get across it, set explosives and destroy it before a large enemy patrol crosses and wipes you out. Then it's on into the jungle again as you search for a village. Now you must be careful not to shoot innocent villagers which will damage your morale and could end your game. In the village you must search the huts for a torch, map and trapdoor that leads and equips you for part two.

In part two you are on your own as you explore a tunnel network that is mapped out on the right hand side of the screen. The other half of the screen shows your view and you should stay alert ready for enemy soldiers and particularly those that swim under the surface of the water that half fills the complex and leap up to knife you. If you're quick enough you can shoot them by aiming a cursor and firing.

Apart from death lurking around every corner you will also find rooms to search that include useful objects such as red cross boxes, flares and a compass that are protected by booby trapped boxes. When and if you emerge from the tunnel you find yourself in a foxhole but your plans to rest until morning are thwarted by an enemy attack. You do have a machine gun but will need all your flares to light up the enemy or you'll be reduced to lucky shots in the dark.

As morning dawns and part three loads you see Sergeant Elias, who led your patrol, gunned down in a hail of enemy fire and discovcer that Sergeant Barnes is indirectly responsible for his death by not helping him. What's left of your innocence quickly departs but before you can act a crackle on the radio warns of a napalm raid in just two minutes. The compass that you collected in the tunnel will guide you north and to safety but you'll have to avoid snipers, traps and even hidden mines. If you succeed you come face to face with Sergeant Barnes. He is in a foxhole armed with a machine gun and grenades and he's trying to kill you – you must avoid his fire and score five direct grenade hits to kill him and claim the foxhole before the air raid strikes.

Each stage of this combat game will demand your skill and reactions are at their best otherwise you'll end up a statistic instead of a high score.

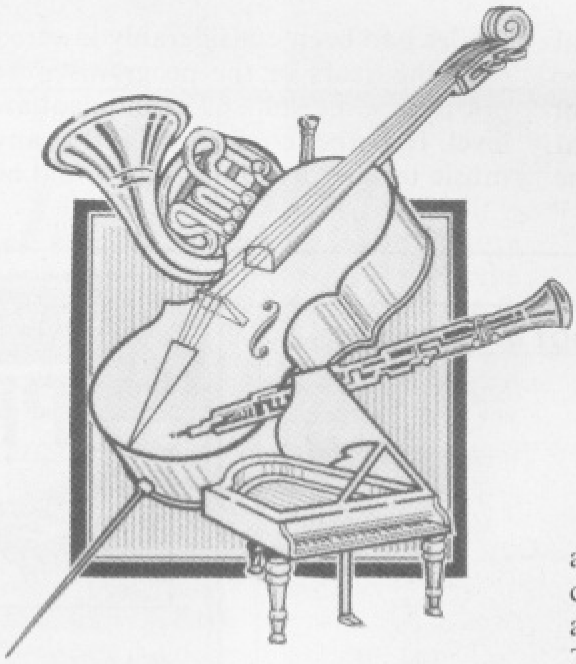
T.H.

Touchline:
Title: *Platoon.* ***Supplier:*** *Ocean Software, 6, Central Street, Manchester, M2 5NS.* ***Tel:*** *061-832 6633.* ***Machine:*** *C64.* ***Price:*** *£8.95 (Ca) £12.95 (disk).*

Teacher's Pet

For the musically minded take a look at the new package specifically created for music students

By Margaret Webb



There have been very few new educational programs about recently and so it was a nice surprise to receive a parcel of four disks from Perfect Fourth Software. These were the component parts of a package designed to help students of music to pass the aural part of their examinations. Hence the title of "Aural".

Each package consisted of a cassette or disk, an instruction book, a booklet about the Associated Board of the Royal Schools of Music Examinations and a music student's practice diary. There are four packages; the first one dealing with Grades 1 and 2. Grade 1 consists of six sections which are:

Scale lesson – this is an introductory lesson to remind the user how the major chord sounds. The chord is played and the *tonic sol-fa* name and the number of the note in relation to the key note are shown simultaneously.

Sing a note – in this section the user practises singing single notes in tune.

Name a note – this helps the user practise recognising a played note. A key chord is played first, and then the key note followed by the test note. The user has to say which note the test note was.

Clap a Rhythm – self-explanatory!

Grade 2 uses the same approach but is a little more advanced. In section 2, three notes have to be sung. In section 3 you also have to name a note but this time with a quicker response. Whether you choose to do section 4 or 5 depends on your singing voice; section 4 is low pitch while section 5 is high. In this test you are given a key note and asked to sing the second, third, fourth or fifth notes of the scale. Section 6 is again clapping a rhythm, but as expected a little more advanced than Grade 1.

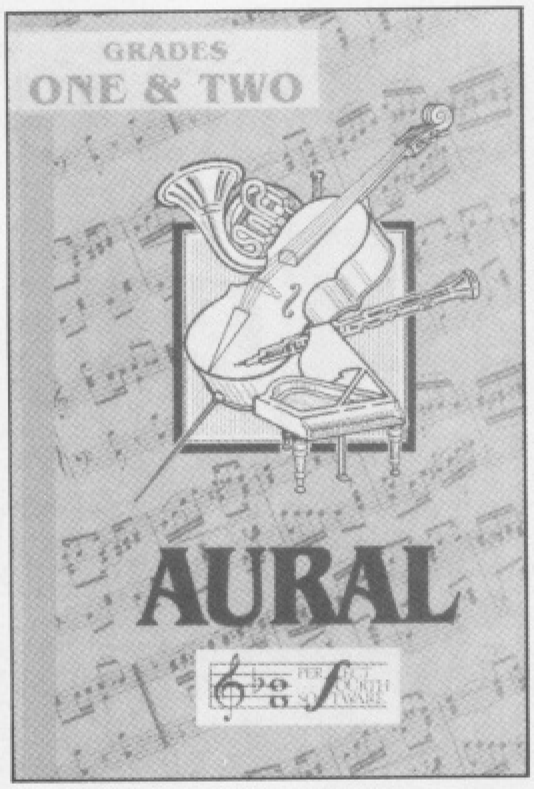
Grade 3 has the same components as the first package. The program contains scale singing similar in approach to its equivalent in Grade 2. The additional areas covered include *interval singing* in which two notes are played and the user is asked to sing either the upper or lower of the notes. In melody singing a key chord is played followed by a four note melody. The user has to sing the melody aloud getting the rhythm and notes correct.

The Grade 4 package follows very much the same pattern as Grade 3. High or low interval singing is similar to Grade 3 except that you are now asked to name the interval. With melody singing the length of the melody is extended to five notes.

Grade 5 starts with scale recognition. The computer plays as a key chord and key note and tells the user the name of the key (C F or G) and then plays another note. The user has to identify the scale. The other sections are very much as for the other levels. All grades have a further option for practising beating time.

Overall, these packages did not measure up to expectation. The programming didn't really use the full capabilities of the computer. Knowing what games writers can get out of the 64, for example, I thought the sounds used were very primitive. The manual suggests connection of the computer to a Hi-Fi system – I'm not sure why. The use of graphics, additionally, was limited to the normal character set with bland coloured screens. Although the content is aimed at aural and vocal skills, more attention to use of graphics and presentation would have added to the appeal. Due to the nature of the subject, much must be left to the honesty of the user. The package does little, however, to encourage the user to practise what is probably one of the most difficult parts of the examinations. The dull presentation could, indeed, have the opposite effects.

I asked a friend who has musical qualifications to look at the programs. His comments after testing them all were not favourable. He said that either the standards required for the



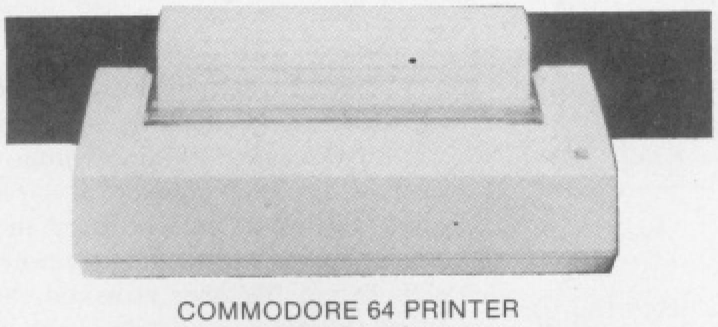
grades had been considerably lowered over the years or the programs were not testing the student to an adequate level. His other comment was that any music teacher worth his salt would be using part of his allotted lesson time for teaching about the aural test and that if he was not, another teacher should be sought. To be fair, these packages are designed to provide practice rather than direct tuition.

Apart from the unexciting presentation, the price of the packages may be against them, although it is refreshing to see a company which doesn't charge an excessive surcharge for the disk version.

As I have said in the past, in order to succeed nowadays, software must be well programmed and presented. I suspect that these packages would have been better if a professional programmer had been used with appropriate guidance for the musical advisors.

Touchline:
Name: *Aural.* ***Supplier:*** *Perfect Fourth Software, 11 Hampstead Lane, Potten End, Berkhamsted, Herts HP4 2QJ.* ***Tel:*** *04427 6311.* ***Prices:*** *Grades 1/2 – £16.65 (tape) £18.45 (disk). Grades 3/4/5 (individual) – £14.85 (tape) £16.65 (disk).*

HUSH 80CD – FULL 80 COLUMN DOT MATRIX SILENT PRINTER £76



COMMODORE 64 PRINTER

Designed and manufactured in Silicon Valley, USA, now also manufactured in Europe.

FEATURES: ★ 80 Column thermal printer ★ 80 CPS Bi-dal ★ Dot addressable graphis ★ Very quiet operation (56Db) ★ Uses low cost thermal paper roll (8½" x 100' Fax paper) ★ Up to 160 characters per line ★ Paper contained internally

Also available from Ergo, full range of Hush 3½" & 5¼" disk drives starting at just £120.

Suitable for C64, BBC, Apple and most others.

Dealer enquiries welcome

Telephone for information 0001 954511
Telephone for Orders 0001 954512

Please supply:
□ Hush 80 CD □ Hush IBM
□ Hush Serial □ Hush Parallel
□ Hush 80 track □ Hush 40 track

Post to: ERGO SYSTEMS, Kingswood Court, Leopardstown Office Park, Foxkrock, Dublin 18, Ireland.

□ Postal Order □ Access □ Visa

Card No. □□□□□□□□□□□□□□□□

Expiry Date: ____

Name: ____

Address: ____

Post Code ____

Daytime Tel. No.: ____

Ref: YC0488

THE MPS803
PRINTKIT IV



AT LAST
Top quality performance from your MPS803 Printer. Simply fit 'PRINTKIT IV' directly to your MPS803 printer and you will get:

*TRUE DESCENDERS *A BOLD OPTION
*UNDERLINING *ITALICS

And up to 50% speed increase!

All facilities are fully CBM compatible "'PRINTKIT IV' is a very impressive upgrade kit" CCI Nov '87.
"Will give your MPS803 a new lease of life" YC Dec '87.
Send just £30.00 to join the hundreds of satisfied customers.

NEW! Coming soon... Connect your MPS803 DIRECTLY to your Amiga, ST, PC,... Full information when you order 'PRINTKIT IV'.

We also supply: Ribbons, Tractor feeds, Serial leads etc. Call for details.

AVON PRINTER TECHNOLOGY

SWINDON HOUSE; 4 HOWARD ROAD; SOUTHVILLE; BRISTOL BS3 1QH. Telephone BRISTOL (0272) 354116
(enquiries from non-UK Distributors welcome)★ add £2.00 P&P for overseas orders 7 days delivery. Full guarantee.



Making GEOS British

Have you ever wished that GEOS had a pound sign?

Have you ever wished that GEOdex was set up for British addresses?

Well read on

By Brian Sedgebear

Just about every Commodore owner will have heard of GEOS, the Macintosh like window environment for the C64. Many magazines, incuding this one, have expounded upon the ease of control of the program and its ability to make using the C64 much easier. However using GEOS and its associated programs does present some problems to the user. The problems exist quite simply because GEOS is an American program, written by Americans for Americans, with no thought being given to we poor Brits who would like to use the program ourselves.

The programs presented here will allow you to Anglisize some of the GEOS suite of programs. Firsly GEOwrite and GEOcalc are given a pound sign, an item that they are sadly lacking, by altering the BSW font. Secondly GEOdex is given postcodes, counties and printed labels in a form the 'Great British Postman' will understand instead of zip codes, states and American address labels. It is important to note that these programs are for use with GEOS V1.2 and V1.3. It can not be guaranteed that they will work with any other version.

Getting Going

Before you rush into typing in the programs and altering your disks, a word of caution. The programs presented here will alter the contents of your GEOS disks, so make sure that you have a couple of backup copies of your GEOS programs before attempting to alter them. After all a simple typing error could be costly and make your GEOS disk unusable. Two programs are given (see rear of the magazine) one for changing the BSW font so that it has a pound sign, the second for altering GEOdex. The programs should be typed in separately and saved to disk before running.

The Works

A simple description of how to use the programs and how they work is given below. An in depth knowledge of how the Commodore disk operating system is needed to understand the program operation fully. I have therefore kept the program explanation extremely simple. Should you be interested in finding out more about your drive then try reading 'The Anatomy of the 1541 disk drive'.

BSW UK

In order to give the user access to a pound sign the program BSW UK simply alters the very last character in

the GEOS character set to the required sign. In order to alter your character set simply LOAD the program given here, put your GEOS disk in the drive and RUN the program. The program will do the rest and tell you of any errors along the way. When the program ends it will boot GEOS if you require. If you do make a mistake or an error occurs then follow the 'restoring your original GEOS disk' section in your GEOS instruction manual.

New Signs

To access the pound sign when in GEOS simply hold down the Commodore sign and press the * key.

There are a number of other characters available to GEOS that aren't mentioned in the manual. These are accessed by holding down the Commodore key together with another key.
- will give an underline.
@ will give a closing '.
up-arrow gives a vertical line.
/ will give a slash in the opposite direction.
Give [and] a try yourself.

Program Description

15	Initialise Drive
20	Opens GEOS kernal file
25-90	Searches GEOS kernal file using BLOCK-LOAD command
95	Sets block pointer to correct byte in block.
100-140	Installs pound sign on disk.
140-155	Informs user of successful operation
160-170	Reboot GEOS
200-205	Check for disk errors.

GEOdex UK OK!

The program to change the ZIP,CITY, Americanized version of GEOdex into more meaningful English is very similar in operation to the previous program. GEODEX UK should be typed in as a normal Basic program, having referred to the LISTINGS article first. Make sure that you SAVE this program before you attempt to RUN it.

When you are ready to make the alterations to your GEOdex disk, LOAD the program GEODEX UK but don't RUN it.

Place your GEOdex disk in your drive and then RUN the program. Your GEOdex disk will then be altered, this will take a couple of minutes. You will be notified when the program has finished.

GEODEX UK works by changing the parameters for the window layout and printer format inside the GEOdex file.

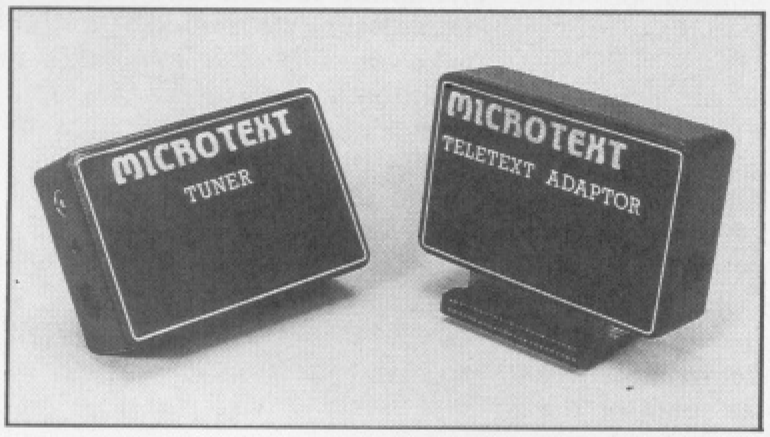
The Basic program works in exactly the same way as the BSW UK program except that it alters one position in the file, alters it and then moves on to another position in the file and alters that.

The first alteration changes the window layout parameters. The second alteration (405-409) is made to the printout section of the program.

GEODEX UK and BSW UK can not be guaranteed to work with all versions of GEOS and GEOdex, we therefore stress the importance of making sure that your disks are backed up before attempting to use any of the programs presented here. Your Commodore will not be held responsible for anyone corrupting their disks. YC

See listing on page 93

TELETEXT A world of information at your fingertips



Teletext on your 64 or 128 brings you hundreds of pages of the very latest information, free! As well as news or football results, there's weather, road reports and even bargain holidays, sections on computing, gardening and motoring plus much much more.

And unlike a Teletext TV you can do a lot more with the information, you can analyse it from your own programs, save pages to disc or cassette, perhaps to keep a watch on share prices, and even print a page like a recipe or whats on TV.

The Microtext Adaptor fits neatly on the user port, just connect it to the Tuner and plug in an aerial or the Adaptor alone may be connected to the VIDEO OUT socket of a video recorder.

"I wouldn't hesitate to recommend this to anyone." – Your Commodore.

The Microtext Adaptor is only £69:95, Adaptor and Tuner just £114:80 inc p/p. Both include lead, software and manual.

In use all over the world. Overseas add £2:00 (£4:00 outside Europe). Tuner for UK only.

Please send cheques/PO's to:-

MICROTEXT

Dept. YC, 7 Birdlip Close, Horndean, Hants PO8 9PW
Telephone: (0705) 595694

RS232 INTERFACE 64, 128 or Plus/4* £34.99
Measuring only 12x69x57mm, the smallest and neatest unit available. Conforms to Commodore 1011A user-port standard. Compatible with BASIC, Easyscript, Superscript, Superbase, Mini Office, Script Plus etc. Connect to RS232 printers, modems and other devices. Supplied with 1 metre of cable (add 75p extra metre*) terminated with a male (female*) 25-way D-connector, or a custom cable made to your requirements. Our after sales service for problem printers guarantees to get you up and running. Supplied with a scrolling terminal emulator program and utilit software on **tape/disk***.

IBM PC File Transfer Utility £9.99
Captures text or binary files via the COMI RS232 port. Supplied on a 360k IBM format 5¹/₄" disk. Simple instructions provided by on-line help.

VIEWDATA TERMINAL 64 or Plus/4 tape/disk* £29.99
Access Prestel, Micronet, CityService etc. Works with any user-port RS232 interface and 1200/75 modem. Displays all viewdata mosaic graphics, double height, hide/reveal and flashing characters in seven colours. Only £14.99 when ordered with the RS232 interface.

CENTRONICS CABLE 64, 128 .... £18.99
Compatible with Easyscript, Superscript etc. Driver for BASIC on disk or tape*.

6502 ASSEMBLER 64 or Plus/4* tape/disk £12.99
A sophisticated two-pass symbolic assembler and text editor which supports tape and desk filing. The assembler, editor, source and object code may all be resident in memory simutaneously, facilitating rapid and interactive code development. No other assembler is quicker to use.

Z80 EMULATOR/ASSEMBLER 64 disk................ £12.99
A unique integrated Z80 development package. The emulator compiles Z80 source code into optimised 6502 which runs on the 64 at about one sixth the speed of a 2MHz Z80. The cross-assembler generates hex or binary Z80 object files. The disk contains a powerful editor and example programs.

Please specify* options. Send cheque/PO. or order by Prices include VAT and P&P. Overseas orders add £2.50. Allow up to 1 week for delivery.

YORK ELECTRONIC RESEARCH
The Fishergate Centre, Dept YC, 4 Fishergate, York YO1 4AB
Tel (0904) 610722

Jinxter

Jinxter is Magentic Scrolls' follow-up to The Pawn and Guild of Thieves; games that have come to be much revered by adventure gamers, largely because of their presentation and performance on 16-bit machines such as the Amiga and, wossname... the Atari ST.

Like Infocom, a company that MS takes after in many ways, this game is tops on packaging. Besides two disks, it comes complete with some curious wossnames... documents. Besides a quick guide to some of the important commands, a copy of the 16-page Independent Guardian, a spoof newspaper and a Department of Guardians Internal Memo.

In the middle of all this verbiage, the keywod 'wossname' looms large (that's enough about wossname – ED). This ambiguous word covers a lot of what you might want to know about the game, but as far as your intrepid reviewer can make out, and mark you I really don't see the significance of the cheese sandwiches, the game has something to do with a lost bracelet.

The bracelet in question, it seems, is the much-coveted Bracelet of Turani, a bauble useful to the people of Aquitania, insofar as it is capable of increasing their previously meagre store of luck. Turani the magician, before departing this mortal coil, left the bracelet in the not-so-reliable hands of the treacherous Green Witches, and appointed a bunch of characters with godlike powers, who also happened to be grimy, inarticulate and lovers of cheese sandwiches to administer the supply of luck to the people of Aquitania.

Sadly, however, an anti-bracelet spell has been concocted by one of the witches, and an uncertain number of charms (for it is a charm bracelet) hanging from the bracelet have gone missing. Without the charms the device will not function. The role of the poor unsuspecting mortal who picks up the job of finding all the bits is to roll back the power of the witches and restore luck to the kingdom.

Sounds like a hideously dull swords-and-magic plot, doesn't it? In fact Jinxter doesn't quite work that way. At the start of the game you find yourself on the way home on a crowded and smelly bus. The social realism lasts quite a long time too. By my 212th move I still hadn't encountered anything more magic than a few rather vidid hallucinations – I've encountered worse after a few jars of Special Brew.

The fact is that this game really rather resembles





Hitchiker's Guide to The Galaxy – the humour is distinctly Adamsesque with a dash of Monty Python. A little derivative, but fun in places. My favourite fictional beast, the dog who swallows microscopic space fleets, even gets a part.

You can get a long way into Jinxter before encountering any real problems. This makes the game very good as a soft introduction to adventure games for newcomers to the genre. An excellent idea of Magnetic Scrolls is to provide a hint list in code in the documentation. There are four or five hints provided for each puzzle, in increasing order of explicitness. To use the facility, you simply have to type a list of double-letter combinations into the computer, and you are told what to do. Unfortunately, for those who don't want to be told, the title of each problem forms a hint in itself.

Which is where any quibbles I have come in. Experienced adventurers may find this game a little slow to get off the ground, besides being a bit of a give-away in places. For a start it accesses the disk a lot – if you're using a 1541 that gives you a lot of coffee breaks. And when I say a lot, I mean a lot – the damn program needs a disk read just to give you an inventory list or do a bit of parsing. Doubtless this was a great idea when implemented on a 16-bitter, but it doesn't cut the mustard on a C64. At least you can turn the graphics off – they're pretty but uninformative.

It's also a bit pompous in places – I have little patience with games that have you continually UNLOCKing things, then(yawn!) OPENing things, then EXAMINEing things to see what's inside. It doesn't give much of a puzzle, and it's quite reasonable, as some games do, to assume that UNLOCK means OPEN as well, and some of them even throw in a description of the contents as well. Not Jinxter – as if there wasn't enough of all this unlocking etc, the most unimportant of doors in this game can blow shut all by itself, requiring you to, of course, OPEN it again (yawn city!).

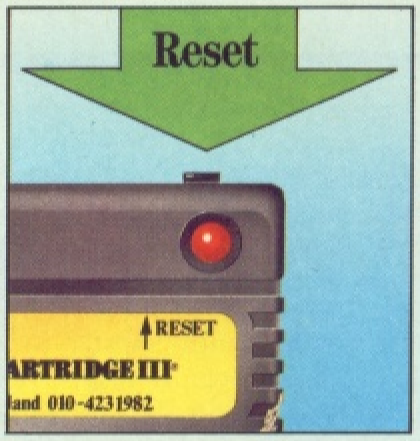
Still, the parser's pretty good, the game picks up later, and the packaging and documentation are great. The worst problem is that slow disk interactiveness. For that, I've lopped a few ponts off my rating. F.F.

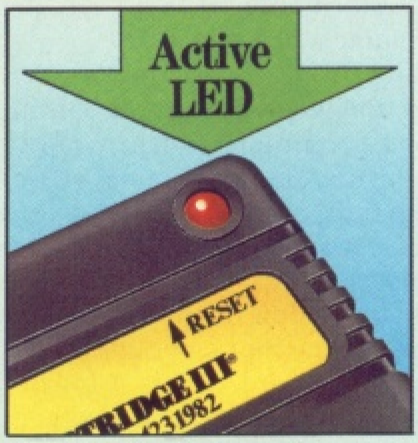
Touchline:

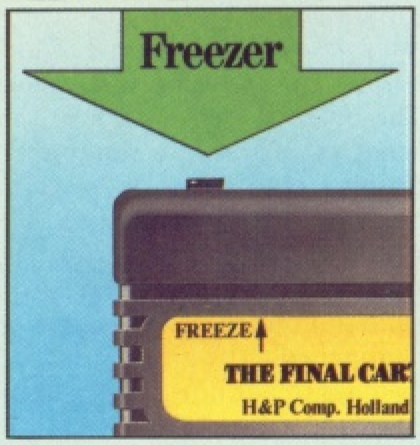
Title: *Jinxter.* ***Supplier:*** *Firebird/Magnetic Scrolls, Wellington House, Upper St Martin's Lane, London WC2H 9DL.* ***Tel:*** *01-379 6755.* ***Machine:*** *C64.* ***Price:*** *£19.95 (disk only).*

KEEP IT SIMPLE!





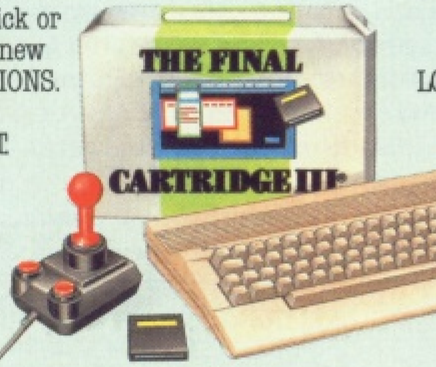




THE FINAL CARTRIDGE III®

A POWERFUL 64K ROM BASED OPERATING SYSTEM FOR THE C64 AND C128

Easy to use WINDOWS and PULL DOWN MENUS allow you to select with either mouse, joystick or keyboard more than 60 new COMMANDS and FUNCTIONS. Various PRINTER-INTERFACES, a BASIC TOOL-KIT



Comfortable ML MONITOR including 1541 drive access and sprite-editing, a NOTEPAD/WORDPROCESSOR with proportional characters, 2 DISK LOADERS with speeds, up to 15 times faster and a state of the art FREEZER. Transform your Commodore into a complete new - AMIGA LOOK ALIKE - system.

WINDOWS



THE FINAL CARTRIDGE III®

The high-resolution bit mapped windows are selected from a menu bar. An unlimited number of windows can be open on the screen at the time. The windows can be freely moved on the screen.

The following windows are already implemented in ROM:

PREFERENCE WINDOW
Selects: mouse port, joystick port, mouse speed, screen colours, pointer clours, keyboard click, keyboard repeat.

CALCULATOR
Complete simulation of a LCD-calculator. Input either with mouse, joystick or keyboard. The numeric key-pad of the C128 can be used in C64-mode.



NOTE PAD
Easy to use wordprocessor with proportional characters enables you to store and print smal notes, letters, etc.

DIRECTORY WINDOWS
Enables you to open directories from different disks and drives, sort and print directories.

DISK WINDOWS
Load, Run, Rename, Validate, Scratch, Initialize Fast format disks.

TAPE WINDOW
Activates fast and normal modes.

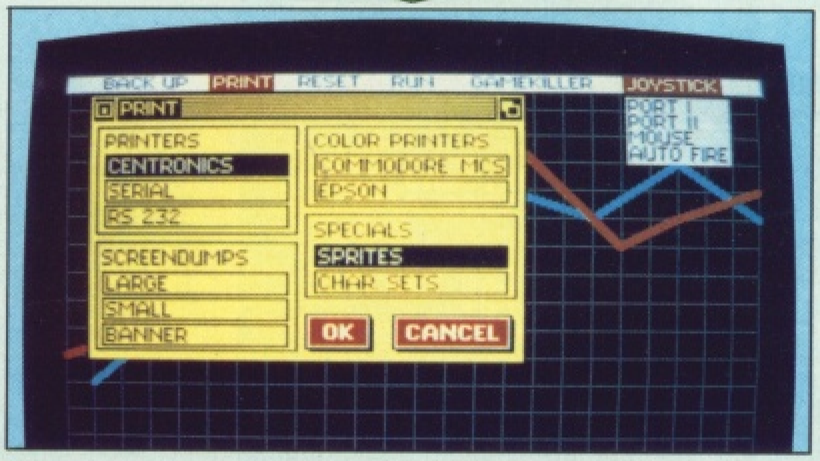
PRINTER WINDOWS
Select different printers, such as Commodore serial, Centronics, RS 232, Colour printers.

REQUESTER WINDOWS

DISC BASED USER WINDOWS

CLOCK
Real Time Clock, with Alarm.

FREEZER MENU



THE FINAL CARTRIDGE III®

Innovative hardware, combined with smart software, allow you to freeze and continue every well-known C64-program.

Freezer options include:

CENTRONICS/SERIAL/RS 232 SCREENDUMPS
● Full A4 printing ● Variable printsize ● Colour printing ● Sprite printing ● Reverse printing ● Colour changes.

GAMEKILLER
● Kills sprite to sprite ● and/or sprite to background collision ● Can be started at any point in your game.

AUTO FIRE
● Transforms a normal joystick to an advanced auto fire engine.

JOYSTICK PORT CHANGER
● Never blow up your computer again by changing joystick ports while the C64 is running.

BACK UPS
● Disk to disk ● Tape to disk ● Disk to tape ● Back up files are packed and reloadable without the Final Cartridge III ● 60K in 15 sec. (disk) ● Exits to Monitor or Basic.

ML MONITOR
Comfortable ML monitor.
Does not reside in memory.
Functions include:
● Scrolling up and down ● 64K ROM/RAM access ● Sprite editor ● Character editor ● Drive monitor ● Fast loading and saving ● Printer driver.

PULL DOWN MENU

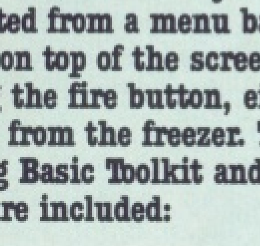


THE FINAL CARTRIDGE III®

Almost all commands and functions that are not activated by windows can be selected from a menu bar, which appears on top of the screen after pressing the fire button, either in Basic or from the freezer. The following Basic Toolkit and keyboard extra's are included:

● Renumber ● Auto ● Delete ● Old ● Help ● Kill ● Find ● Replace ● 24K extra RAM for Basic ● Append ● DAppend ● DSave ● DOS ● Monitor ● Drive monitor ● Sprite editing ● Centronics interface ● Fast format ● Low Res screen-dumps ● Plist ● Scrolling up and down ● Stops and continues listings ● Pro-grammed functionkeys ● Packer/Cruncher ● Hex to decimal conversion ● Pokes, syscalls and variables may all have Hexadecimal values ● Trace, Dump, Order, Mem.





ortional
print small

different
ctories.

, Initialize,

mmodore
nters.

FINAL CARTRIDGE is a super powerful Utility/Backup Cartridge to give your 64/128 **AMIGA LOOK-A-LIKE SCREENS** Plus backup power and unmatched Toolkit!

When reviewing **FINAL CARTRIDGE III, Comodore Computing International said,** "This product is so versatile, so easy to use, it deserves the highest commendation. If you want probably the best utility around check out **FINAL CARTRIDGE III**."

ONLY £39.99 POST FREE

ALL ORDERS NORMALLY DESPATCHED WITHIN 48 HRS

HOW TO ORDER ....

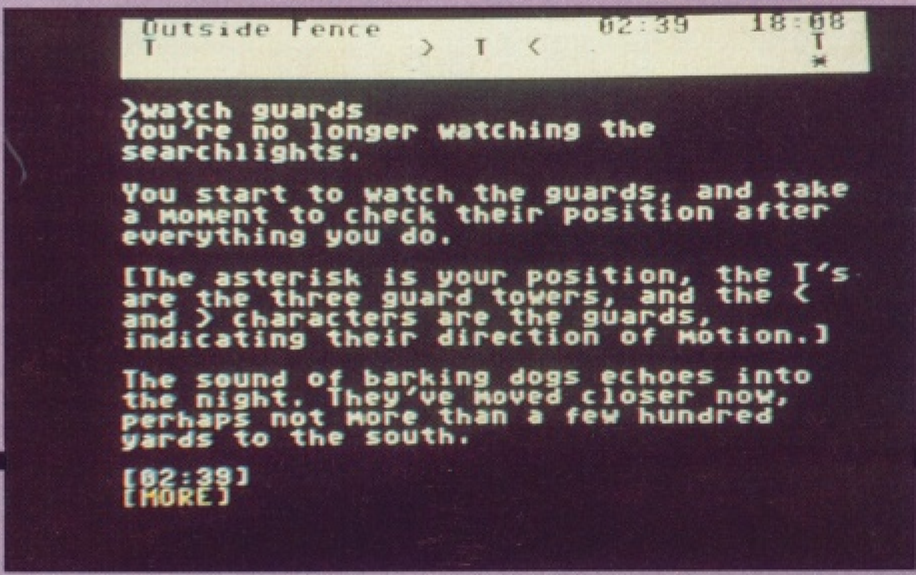
BY PHONE	BY POST	BY PRESTEL/FAX
0782 273815 24 hr Credit Card Line	Send cheques/POs made payable to 'Datel Electronics'	Prestel Pages # 258800000A Fax Orders 0782 264510

DATEL ELECTRONICS

UNITS 8/9, DEWSBURY ROAD, FENTON INDUSTRIAL ESTATE, FENTON, STOKE-ON-TRENT. TELEX:

SALES ONLY	TECHNICAL ONLY
0782 273815	0782 202258

Border Zone



Washington and Moscow are the capitals of the superpowers but the Cold War is fought in Eastern Block countries like Frobnia and the adjacent neutral state of Litzenburg. This is the setting for Infocom's Border Zone, a spy thriller in which you play three separate parts in three separate but linked adventures.

The game begins on the night train from Frobnia to Litzenberg. You are a tired businessman and not enjoying the bumpy journey at all, simply glad to be out from behind the iron curtain. You were even lucky enough to get a compartment to yourself but then your luck changes. Suddenly, the compartment door flies open and a man who's obviously been shot in the arm staggers in and gives you a document. Although the document is written entirely in Frobnian you realise it's important and agree to give it to the contact at the next station and foil a plot to assassinate the American ambassador. The agent is soon gone leaving you with a fresh bloodstain on the carpet, a white carnation pinned to your lapel (the sign for the contact) and a document that could get you arrested. You look outside into the train's corridor and see that police are everywhere and a man in a trench coat going from compartment to compartment and he's only three doors away from yours!

Whatever, you are going to do you'd better do it fast as if your arise suspicion you won't be allowed off the train to hand the document to the contact who you don't know who speaks a language you don't understand. If you solve that lot and have listened carefully to the agent and meet the contact you can warn the authorities of the impending assassination attempt and then climb back on the train that will take you to safety.

In part two, you are once again travelling towards the border but this time you're the American agent and you've just jumped off the train. You're stunned, wounded, cold and already you can hear packs of dogs looking for you and even the sound of an approaching car. You dismiss the chance that the car passengers will help you and dive into the safety of the woods and see a hut. As you approach the hut the car pulls up and guards climb out and if they don't see and arrest you then warn the hut's occupant that you're on the loose. This leaves you cold, wounded, hunted and alone.

The border lies just to the North but before you get there you will have to avoid the guards and dogs and your state of health before you work out how to avoid the searchlights, border guards and fences of the border that lies between you and safety.

In chapter three you are a Russian double agent sent by the KGB to look after the assassination attempt of the visitng American ambassador. You're there to ensure that all goes well although the Kremlin has found an Iranian to pull the trigger and deflect the blame from Moscow.

It is now 11:47 and you're standing in the square in the Litzenberg border town of Ostnitz. In under five minutes the Ambassador will speak in the square and the assassin will strike. Unfortunately, you are a double agent and must stop the sniper! You might get some help from your KGB contact Riznik who owns an antique shop but again you're on your own. You must stop the assassination without alarming the police, the Russians or being caught by the American agent who you have just spotted in the cafe. If he sees you he'll shoot and ask questions later. The resulting conclusion to the game is a desperate race against time in which you must save the ambassador without blowing your cover.

To help you in your three missions the game disk is accompanied by the usual superb Infocom packaging which includes a map of the Border Zone, a matchbook from the Frobnian railways, a Frobnian tourist guide and phrase book and a business card from Riznik's antiques.

Border Zone is packed with the Infocom style text descriptions that pile on the atmosphere and tension which is enhanced as this is the first real time Infocom adventure. A clock at the top of the screen ticks the minutes by that could bring the man in the trenchcoat closer, the guards and their dogs nearer or the assassins finger to the trigger.

It's not as difficult as some other Infocom adventures and also includes on-line hints that could guide you to the solutiuon (only use these if you're absolutely desperate). A tense spy thriller which casts you in three major parts.

T.H.

Touchline:
Title: *Border Zone.* ***Supplier:*** *Infocom/Activision, 23 Pond Street, Hampstead, London NW3 2PN.* ***Tel:*** *01-431 1101.* ***Machine:*** *C64.* ***Price:*** *£19.99 (disk only).*

state of
lights,
en you

ent by
of the
e that
ian to

in the
es the
n will
t stop
ontact
your
ng the
agent
u he'll
ion to
must

disk is
which
m the
phrase

e text
hich is
ure. A
could
their

ntures
to the
te). A
ts.
T.H.

Pond
1101.

POOLSWINNER II

THE ULTIMATE POOLS PREDICTION PROGRAM



- **MASSIVE DATABASE** Poolswinner is a sophisticated Pools prediction aid. It comes complete with the largest database available – 22000 matches over 10 years.
- **PREDICTS** Not just SCOREDRAWS, but AWAYS, HOMES and NO SCORES.
- **SUCCESSFUL** SELEC guarantee that Poolswinner performs significantly better than chance.
- **ADAPTABLE** Probabilities are given on every fixture – choose as many selections as you need for your bet. The precise prediction formula can be set by the user – you can develop and test your own unique method.
- **SIMPLE DATA ENTRY** All team names are in the program. Simply type in the reference numbers from the screen. Or use FIXGEN to produce fixture list automatically (see below).
- **LEAGUE AND NON-LEAGUE** All English and Scottish League teams are supported, and also the non-league sides often used on pools coupons.
- **PRINTER SUPPORT** Full hard copy printout of data if you have a printer.

Boxed, with detailed instruction booklet

PRICE £15.00 (all inclusive)

NOW AVAILABLE

FIXGEN 87/8

AT LAST: No more struggling for hours to get the fixture list into the computer. FIXGEN has been programmed with all English and Scottish League fixtures for 1987/8. Simply type in the date, and the full fixture list is generated in seconds. Fully compatible with Poolswinner. Yearly updates available.

POOLSWINNER with FIXGEN £16.50 (for both)

COURSEWINNER V3

THE PUNTERS COMPUTER PROGRAM



NOT JUST A TIPSTER PROGRAM, Coursewinner V3 can be used by experts and occasional punters alike. You can develop and test your own unique winning system by adjusting the analysis formula, or use the program in simple mode. Coursewinner V3 uses statistical analysis of major factors including past form, speed ratings, course statistics, prize money, weight, going, trainer and jockey form etc, etc. It outputs most likely winners, good long odds bets, forecasts, tricasts etc. The database includes vital course statistics for all British courses. You can update the database – never goes out of date. *FULL PRINTER SUPPORT.*

PRICE £15.00 (all inclusive) includes Flat AND National Hunt versions.

ALL PROGRAMS AVAILABLE FOR: AMSTRAD CPCs, AMSTRAD PCWs, PC1512, All BBCs, All SPECTRUMS, COMMODORE 64/128.
Supplied on tape (automatic conversion to disc) – except PCW and PC1512 (on disc – add £3.00).

order with VISA phone 24 hrs — Send Cheques/POs for return of post service to . . . — order with Access phone 24 hrs

selec SOFTWARE

37 COUNCILLOR LANE, CHEADLE, CHESHIRE SK8 2HX. ☎ 061-428 7425

(Send for full list of our software)

WORLDWIDE ·SOFTWARE·

C64/128	cass	disk
Airborne Ranger	11.20	14.95
Alternate World Games	7.25	11.20
Bankok Knights	7.25	11.20
Blood Valley	7.25	11.20
Buggy Boy	7.25	11.20
B24	11.20	14.95
California Games	7.25	11.20
Combat School	6.55	9.75
Compendium	7.25	11.20
Driller	11.20	14.95
Elite 6 Pack Vol 2	7.25	11.20
Eye	7.25	11.20
Firetrap	7.25	11.20
Flight Sim II	29.95	37.95
Flying Shark	6.55	9.75
Football Director	6.55	
G Linekers Super Soccer	7.25	11.20
Galactic Games	7.25	11.20
Game Set & Match	9.75	13.50
Garfield	7.25	11.20
Gnome Ranger	7.25	7.25
Gryzor	6.55	9.75
Gunboat	6.55	10.95
Gunship	11.20	14.95
International Karate +	7.25	11.20
Knight Orr	11.20	11.20
Last Ninja	7.25	11.20
Live Ammo	7.25	11.20
Match Day II	6.55	
Mini Office	12.75	14.95
Morpheus	6.55	9.75
Outrun	7.25	9.00
Pirates	11.20	14.95
Predator	7.25	11.20
Psycho Soldier	6.55	9.75
Rampage	7.25	11.20
Red October	11.20	14.95
Roy of the Rovers	7.25	11.20
Rygar	7.25	11.20
Salamander	6.55	11.20
Shoot em Up Const. Set	11.20	14.95
Slaine	7.25	9.75
10 5¼" Blank Disk		7.99

AMIGA

California Games	18.95
Defender of the Crown	22.95
ECO	18.95
Flight Simulator II	37.95
Garfield	14.95
Gridstart	7.25
Guild of Thieves	18.95

C64/128	cass	disk
Stealth Fighter	11.20	14.95
Street Baseball	7.25	9.00
Street Basketball	7.25	9.00
Subbattle Simulator	7.25	11.20
Super Hang On	7.25	11.20
SuperSprint	7.25	11.20
Through the Trap Door	6.55	11.20
Thundercats	7.25	11.20
Victory Road	6.55	9.75
Wizard Wars	7.25	9.00
World Class Leaderboard	7.25	11.20
720 degrees	7.25	9.00

C64/128 Disk only

Alternative Reality Dungeon	14.95
Autoduel	14.95
Battlecruiser	19.95
Battles in Normandy	18.95
Broadsides	19.95
Carriers at War	24.95
Colonial Conquest	19.95
Defender of the Crown	11.20
Destroyer	11.20
Europe Ablaze	23.95
Guild of Theives	14.95
Hitchikers Guide to Galaxy	19.95
Hollywood Hi Jinx	19.95
Jinxter	14.95
Leather Goddess (Adults only)	19.95
Lurking Horror	19.95
Panzer Grenadier	19.95
Plundered Heat	11.20
Russia	17.95
Shylo	19.95
Silent Service	11.20
Stationfall	19.95
The Pawn	14.95
Ultima I/III/IV/V	14.95
Up Periscope	28.95
USAAF	23.95
Wargame Construction Set	14.95
Witness	19.95
Lockable 100 disk storage box	9.95
or storage box + 10 Blank disk	16.95

AMIGA

Insanity Flight	18.95
King of Chicago	22.95
Red October	18.95
SDI	22.95
Silent Service	18.95
Sinbad	22.95
Terrapods	18.95

PLEASE PHONE FOR DISCOUNT PRICES OF ITEMS NOT LISTED

All prices include post & packing in U.K. Overseas orders please add £1.00 per cass/disk for AIR MAIL delivery.
Cheques or postal orders payable to:

WORLDWIDE SOFTWARE (DEPT COM)
1 Bridge Street, Galashiels TD1 1SW Tel: 0896 57004

all items subject to availability E & OE

STORT SOFT

MAIL ORDER SPECIALISTS

ALL DISKS CARRY A NO QUIBBLE REPLACEMENT GUARANTEE ARE CERTIFIED 100% ERROR FREE & COME WITH LABELS, 5 1/4" ALSO HAVE SLEEVES & WRITE PROTECTS.

3.5" SPECIAL OFFERS

25 SS/DD 135TPI(MF1DD) & 80 or 60/90 LOCKING DISK BOX	32.00
50 SS/DD 135TPI(MF1DD) & 80 or 60/9/ LOCKING DISK BOX	55.00
25 DS/DD 135TPI(MF2DD) & 80 or 60/90 LOCKING DISK BOX	35.00
50 DS/DD 135TPI(MF2DD) & 80 or 60/90 LOCKING DISK BOX	61.00

135TPI UNBRANDED	10	25	50	100	500	10 in a case
SS/DD (MF1DD)	10.00	24.00	47.00	92.00	399	11.00
DS/DD (MF2DD)	11.50	27.00	53.00	99.00	429	12.50

SPECIAL OFFER!

25 SS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	16.00
50 SS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	25.00
100 SS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	39.95
25 DS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	17.00
50 DS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	26.50
100 DS 48TPI 5.25" DISKS & 100 CAP LOCKING DISK BOX	42.00

BLANK 5 1/4" DISKS - DISK NOTCHER FREE WITH EACH 100 DISKS PURCHASED

UNBRANDED	TRIAL 10	25	50	100	10 in a plastic lib. case
SS/DD 48 TPI	4.50	9.00	17.00	33.00	5.50
DS/DD 48 TPI	5.50	11.00	19.00	35.00	6.50
DS/DD 96 TPI	6.50	13.00	21.00	37.00	7.50

BRANDED PRECISION DS/DD 48 TPI - BOX OF 10 ONLY!! 6.99

AMIGA/ST/IBM - CENTRONICS PRINTER LEAD **7.95**
RS232 MODEM LEAD **7.95**
DISK CLEANING KITS (NON ABRASIVE) - 3.5" **3.95** 5.25" **3.95**
5.25" DISK NOTCHER **3.95**
2 WAY SWITCH BOX (2 IN 1 OUT OR 1 IN 2 OUT) - CENTRONICS **24.95**
RS232 **24.95**

DUST COVERS - Protect your valuable hardware and keep it looking smart and tidy with these clear P.V.C. anti-static covers with black piping.
AMIGA A500 **3.95** CBM 64 **3.95** CBM 128 **3.95**
C2N TAPE DECK **2.95** 1541 DISK DRIVE **2.95**

ACCESS/MASTERCARD/EUROCARD/VISA use the Credit Card order line on 027989-509, 24 hours a day, 7 days a week, VAT & P&P included.
CHEQUES/POSTAL ORDERS PAYABLE TO

STORT SOFT
18 CROWN CLOSE, SHEERING, BISHOP'S STORTFORD, HERTS. CM22 7NX

BACK UP! TRANSFER! CONVERT! ANY PROGRAM

TAPE TO DISK
DISK TO DISK
DISK TO TAPE
TAPE TO TAPE

FOR ONLY **£29.99** INC VAT & POSTAGE



WITH THE AMAZING EXPERT CARTRIDGE
NOW INCLUDING THE LATEST V.3 UPGRADE

- THE ONLY USER PROGRAMMABLE BACK-UP & UTILITY FOR 64/128 (64 MODE).
- EASY & CHEAP TO UPGRADE - JUST £3.50 FOR UPGRADE SOFTWARE ON DISK OR TAPE.
- FULL 64K M/CODE MONITOR.
- SCREEN & PICTURE PRINTER DUMPS.
- SPRITE EXTRACTOR & EDITOR.
- SAVES PROGRAMS IN ONE FILE (EXCL. MULTIPART ONES).
- SUPER EFFICIENT COMPACTOR - SAVE 3 OR MORE PROGRAMS PER DISK.
- TURBO RELOADER & DECOMPACTOR - RELOADS & RESTARTS PROGRAMS IN SECONDS.
- EXPERT NOT NEEDED FOR LOADING BACK.
JOIN THE INTERNATIONAL EXPERT USER CLUB.

PLEASE STATE DISK OR TAPE SOFTWARE WHEN ORDERING.

TRILOGIC Trilogic Dept. YC., Unit 1,
253 New Works Road
Bradford, BD12 0QP. Tel. 0274 691115

FAST MAIL ORDER SERVICE · PROMPT DESPATCH · ALL PRICES FULLY INCLUSIVE PLUS 10 DAY MONEY BACK GUARANTEE ON ALL ITEMS. PAYMENT BY CASH, CHEQUES PAYABLE TO TRILOGIC BY POSTAL ORDER, ACCESS, OR VISA. ADD £1 EXTRA FOR EXPORT ORDERS, PAYMENT IN STERLING ONLY PLEASE.

Evesham Micros

For Speed, Power and Ease of Use

FREEZE MACHINE

Only £28.95

Chills the rest !

Features...
"Single part save"
Includes...
"Freeze Frame Mk V & Lazer II"



Features include...

- Totally unstoppable Freeze
- Fast save routines
- Ultra efficient file compactor
- Game killer
- Lazer and Turbo Fastloads
- Integral Reset button
- Tape turbo facilities
- 12 second disk Format
- Selective file copier
- Selectaload
- Plus many more !

UPGRADES

MkI, II, III, IIIB	£ 19.95
MkIV	£ 7.95
Lazer	£ 2.00

The most effective backup cartridge on the market? We feel no other "device" can remotely match the speed, power and ease of use of the FREEZE MACHINE. It's speed of operation is the most amazing feature - imagine being able to SAVE & reLOAD your favourite games in as little as 10 seconds and no more than 18. Buy one and see it perform, if you don't agree that it is the most formidable cartridge available, return it within your statutory 28 days for full refund - we are that confident!

Freeze Machine Utility Disc V3.0

Including over 30 routines, this is the latest version of the disk tha complements use of the Freeze Machine. Used in conjunction wit the catridge, it allows the complete transfer to disk of many programs that load extra parts, eg. Gunship, Last Ninja, Worl Games & Supercycle. A very useful add-on to Freeze Machine

Upgrades: £2.00 **ONLY £7.95**

Dolphin DOS

Install Dolphin DOS and prepare to be amazed! LOADs & SAVEs files up to 25 times faster, LOADs 202 blocks in less than 5 secs, yet still maintains standard CBM disk format! Compatible with the majority of commercial software, it is now the established standard parallel operating system for the 64/128 using the 1541 disk drive, and includes many extra DOS & BASIC commands, a built-in monitor and Centronics printer driver, plus numerous other useful features.

Only £69.95

DOUBLER
THE tape backup device

The most effective product of it's type, the DOUBLER makes perfect first generation backups of your tape software. Consists of hardware and software, and requires access to two CBM type data recorders. So easy to use - works every time!

Only £12.95

1541 Exam

Problems with 1541 disk drive head alignment? No problem! This package contains a digital alignment disk and drive fault diagnosis software that will allow you to both **check** *and* **correct** head alignment on your 1541. Package also includes quiet drive stops to silence that 'knocking noise' associated with the drive.

Only £39.95

Disc Disector V5.0

Our popular disk backup/utility package features a wide range of powerful programs. The 'nibblers' provided will backup most-all protected software, and includes options for 3 or 8 minute copy and usage of 2nd drive. Utilities include: Menu Maker, Disk Orderly, Disk Rescue, Discmon+, Scratch/Unscratch, Fast Format, Disc to Tape, Selective filecopy, and many more. Also compatible with 128,128D & 1570 drive.

Only £19.95

Amiga 500

Amiga 500 .... £ 449.00
Includes Deluxe Paint, ,Silent Service & 5 disks full of public domain software.

Phillips CM8833 (Monitor, suits A500).... £ 279.00
Stereo sound colour monitor, includes cable for A500.

***SPECIAL OFFER.....*Amiga 500 with Amiga 1081 Monitor, only............£ 669.00**

Disks & Boxes

25 bulk packed DS/DD disks, with sleeves, w/p tabs and labels. Good quality and fully guaranteed, only.................................£ 13.95

25 disks + box. Disks as above plus 50 capacity locking storage box, only ....£ 22.95

25 disks + 100 box. As previous offer but with 100 capacity locking box. ....£ 24.95

50 capacity box. Hi-quality lockable storage for 5.25" disks. Smoked Perspex top .....£ 10.95

100 capacity box. Larger version ....£ 13.95

Selected products

NEOS Mouse + Cheese. A very popu add-on for 64/128 users. High quality mous comes with full colour graphic software...... £24.9

'64 POWER PACK. Replacement power su ply unit to suit the '64 ....£24.9

MOTHERBOARD. 4 slot with either all uprig or with one straight thro' for modem use (plea state type when ordering............................£28.0

XETEC SUPERGRAPHIX. The best centroni interface for 64/128. Features 8K buffer and allo for downloadable fonts. Excellent value £69.9

DATA RECORDER. CBM compatible typ same as C2N/1531 but cheaper and includes pause control £24.9

AZIMATE 3000. Multiple cassette loadi difficulties? Check and adjust your CBM casset unit when necessary with this head alignment k Very easy to use £6.9

1541C DISK DRIVE. We have them in sto but why not buy an Excelerator which is a bett performer, has many advantages, comes with fr software and is much better value............£189.9

1541 QUIET DRIVE STOPS. Woodpeck trouble? Silence your 1541 now with these easy fit stops. Also prevents head mis-alignment. Tw sets provided to do 2 drives (not suitable for 'tu lever' types) £4.9

In Australia contact: Micro Accessories of S.A., Unit 8, Hewittson Rd, Elizabeth West, S. Australia 5113 Tel: (08) 287-0191

Dynamic Duo



A SUPERB BUNDLING OFFER

FEATURES

- ★ Extremely compatible
- ★ Xcellent value
- ★ Compact size
- ★ Even lower price
- ★ Low noise
- ★ External 8/9 switch
- ★ Rave reviews
- ★ Attractive appearance
- ★ Turbos, no problem
- ★ One year guarantee
- ★ Runs cool
- ★ +Direct Drive Motor

Now at an **even lower price,** this superb bundling offer combines the critically acclaimed **Excelerator+** with the super sophisticated **GEOS** (**G**raphic **E**nvironment **O**perating **S**ystem.) **GEOS** brings the power of a graphic interface and integrated disk turbo to the '64/128, from which you can access **geoPAINT**, a full-featured graphic workshop, **geoWRITE**, an easy-to-use WYSIWYG word processor and **Desk Accessories** which include Calculator, Notepad, Alarm clook, Photo album, etc. Many more extensions are available such as spreadsheet **geoCALC**, database/ mail-merge **geoFILE**, etc.

NEW LOWER PRICE !

Excelerator+ & GEOS £129.95

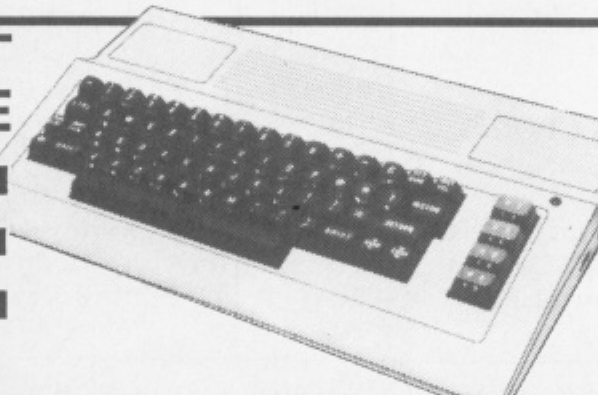
Excelerator+ & GEOS, *PLUS* Freeze Machine £149.95

GEOS Products

Full range of GEOS products for the 64 & 128 at the best prices.

GEOS 64	£24.95
GEOFILE	£24.95
GEOCALC	£24.95
GEODEX/ DESKPACK	£21.95
GEOWRITE WORKSHOP	£24.95
FONTPACK ONE	£16.95
GEOSPELL	£16.95
GEOPUBLISH	£32.95
GEOS 128	£32.95
GEOWRITE WORKSHOP 128	£32.95

GET THE SLIMLINE '64



Your '64 could look like this!

Why put up with an old fashioned looking computer? Fit one of these smart and modern looking new cases to your trusty '64, and it will look and feel like you are using a brand new computer. This high quality injection moulded case is simple to fit and gives a lower keyboard height. Don't put up with the old image, order one *now.*

Only £19.95

IconTroller

Only £11.95

By Suncom, the keyboard mounted cursor controller, a natty little stick that attaches to your Commodore keyboard. Ideal for Icon-driven software, and perfect for GEOS applications.

LC-10 from star

The *NEW* No.1 CBM ready printer



- Four NLQ fonts, yes FOUR
- Paper Parking (use single sheets without removing tractor paper)
- Comprehensive 'front panel' operation of most modes
- 96 NLQ print combinations
- 144/36cps print speed
- Auto single sheet feed
- Tractor and Friction feeds
- Double & Quad height characters

Offering even MORE features than the NL10 it replaces, the LC-10 is the new No.1 from Star. Incorporating facilities not seen in this price range before, it is available as a Commodore ready printer for 64/128 users or as a standard parallel version for Amiga owners. Supplied with all cables, ready to operate, simply state your computer type when ordering.

Evesham Inclusive Price... Only £199.00

SPECIAL...Price includes TWO extra ribbons free of charge.

Evesham Micros

All prices VAT/delivery inclusive. Next day delivery £5.00 extra.

How to order...

Send cheque P.O. or ACCESS/VISA details
Phone with ACCESS/VISA details
Govt., educ. & PLC official orders welcome
Same day despatch whenever possible
Callers welcome, open 6 days 9.30-5.30
All offers subject to availability, E.&O.E.
TELEX: 333294 FAX: 0386 765354

Evesham Micros
63 BRIDGE STREET
EVESHAM
WORCS. WR11 4SF
Tel: (0386) 765500

VISA

ALSO AT: 1756 PERSHORE RD., COTTERIDGE, BIRMINGHAM, B30 3BH. TEL: 021 458 4564

The ICPUG Column

The third column in a regular series of ICPUG – Britain's biggest independent Commodore user group.

By Tim Arnot

In my last column I talked about data transfer between machines – specifically the 64/128 and the Amiga – using asynchronous RS232 and Kermit or Xmodem file transfer protocols. Not long after I wrote it, I had a phone call from an ICPUG member who was trying to do exactly that, except he was using the parallel user port on the 64 hooked up to the parallel printer port on the Amiga.

Thinking about it, this is not an unreasonable way to go about it, and it's certainly cheaper than buying an RS232 interface for the 64, especially if you're at the stage of transferring files to a new machine, you are likely to be in imminent danger of selling the old one. There is a problem though. The parallel printer (PRT:) on the Amiga, and indeed on any PC is an output device only. It is easy to send data from the new computer to the old one but not vice versa.

By a strange coincidence, the Amiga's general 1/0 chips (8520s) are register compatible with the 6526s on a 64. Both are called CIAs! Thus, we are in a position to bypass the built-in device drivers and program the hardware directly. In fact from BASIC, the code is pretty much identical for both machines – only the addresses have been changed to protect the innocent.

Hush, Hush ...

Now, what I am proposing here is, naughty, strictly speaking, since the multi-tasking rationale behind Amiga strongly disuades us from hacking the hardware directly – what if some other task legally tries to use PRT? OK, I plead guilty here, but needs must, etc., and what Amiga DOS won't do.. Just make sure nothing else accesses the printer while transferring your files.

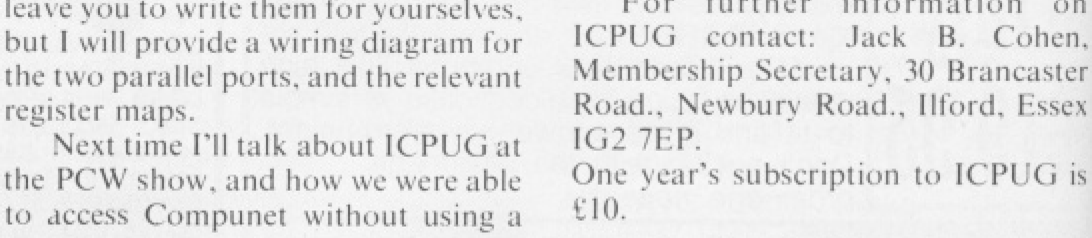
64 Address	64 Register Function	Reg. Name	Amiga Register Function	Amiga Address
$DD00	SERIAL BUS (DISK 1/0)	PRA	DISK CONTROL + MISC I/0	$BFE001
$DD01	USER PORT D0-D7 (+RS-232)	PRB	PARALLEL PRINTER D0-D7	$BFE101
$DD02	DATA DIRECTION	DDRA	DATA DIRECTION	$BFE201
$DD03	(0 =INPUT)	DDRB	(0 = INPUT)	$BFE301
$DD04	TIMER A	TALO	TIMER A	$BFE401
$DD05		TAHI		$BFE501
$DD06	TIMER B	TBLO	TIMER B	$BFE601
$DD07		TBHI		$BFE701
$DD08		(TODT)	EVENT	$BFE801
$DD09	T.O.D. CLOCK	(TODS)		$BFE901
$DD0A		(TODM)		$BFEA01
$DD0B		(TODCK)	No Connect	$BFEB01
$DD0C	Serial Data Register	SDR	Serial Data Register	$BFEC01
$DD0D	Interrupt Control	ICR	Interrupt Control	$BFED01
$DD0E	Control Regs	CRA	Control Regs	$BFEE01
$DD0F		CRB		$BFED01

6526 (C64) and 8520 (Amiga) Register Map

The actual programs... well, I'll leave you to write them for yourselves, but I will provide a wiring diagram for the two parallel ports, and the relevant register maps.

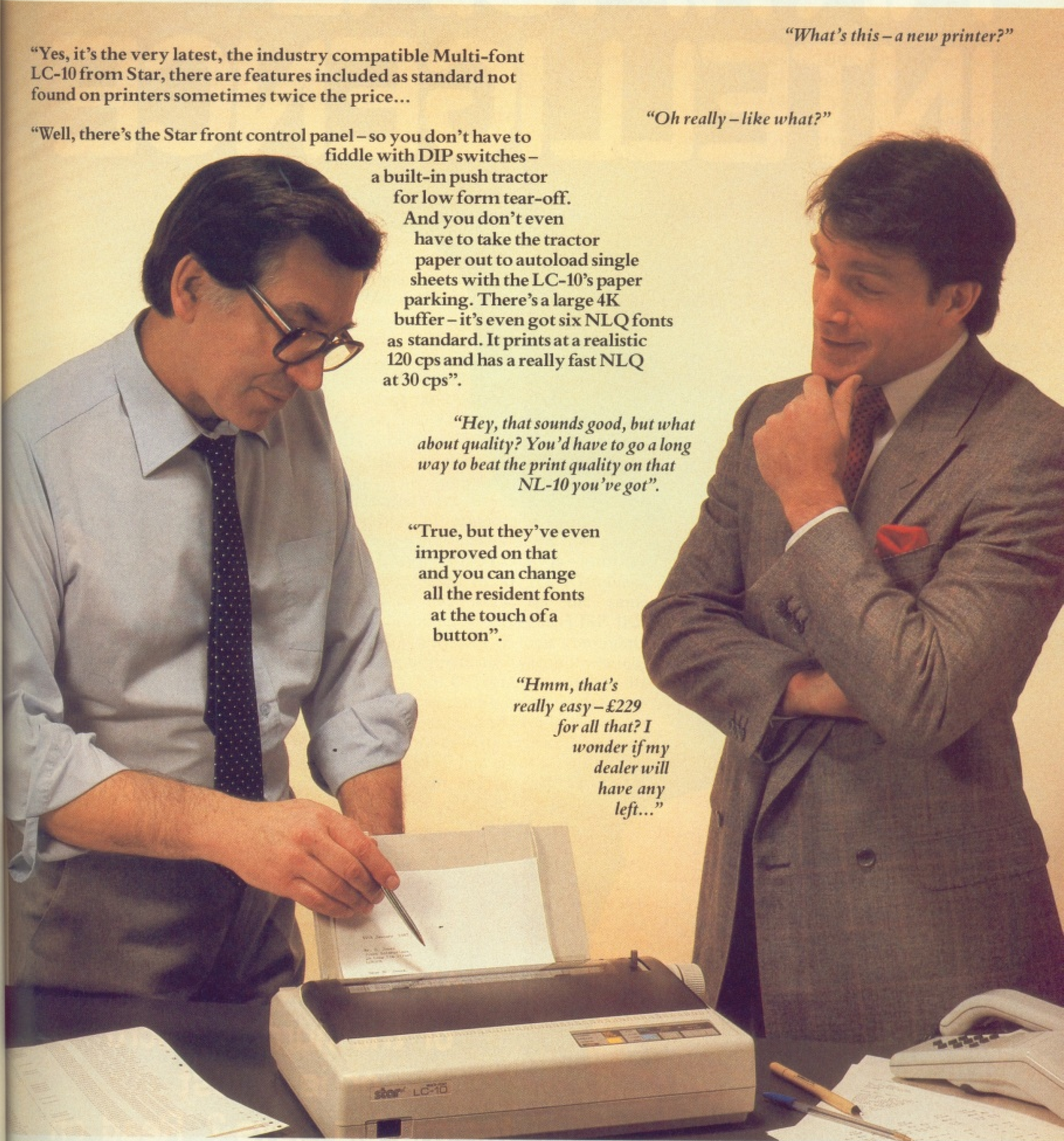
Next time I'll talk about ICPUG at the PCW show, and how we were able to access Compunet without using a 64, 128 or Commodore modem. See you on the bit stream.

For further information on ICPUG contact: Jack B. Cohen, Membership Secretary, 30 Brancaster Road., Newbury Road., Ilford, Essex IG2 7EP.
One year's subscription to ICPUG is £10.



Cable Wiring For Parallel Data Transfer

"£229 for all that?"



"What's this – a new printer?"

"Yes, it's the very latest, the industry compatible Multi-font LC-10 from Star, there are features included as standard not found on printers sometimes twice the price...

"Oh really – like what?"

"Well, there's the Star front control panel – so you don't have to fiddle with DIP switches – a built-in push tractor for low form tear-off. And you don't even have to take the tractor paper out to autoload single sheets with the LC-10's paper parking. There's a large 4K buffer – it's even got six NLQ fonts as standard. It prints at a realistic 120 cps and has a really fast NLQ at 30 cps".

"Hey, that sounds good, but what about quality? You'd have to go a long way to beat the print quality on that NL-10 you've got".

"True, but they've even improved on that and you can change all the resident fonts at the touch of a button".

"Hmm, that's really easy – £229 for all that? I wonder if my dealer will have any left..."

THE Star
PRINTERS FOR BUSINESS

Star Micronics U.K. Ltd.,
Craven House, 40 Uxbridge Road,
Ealing, London W5 2BS.
Telephone: 01-840 1800.

A division of
Star Micronics Co., Ltd., Japan.

Price excl VAT.

I'd like to find out if my dealer has any left. Please send me an LC-10 brochure ☐
Please send me details of the Star range of dot matrix printers ☐

Name ______________ *Company* ______________

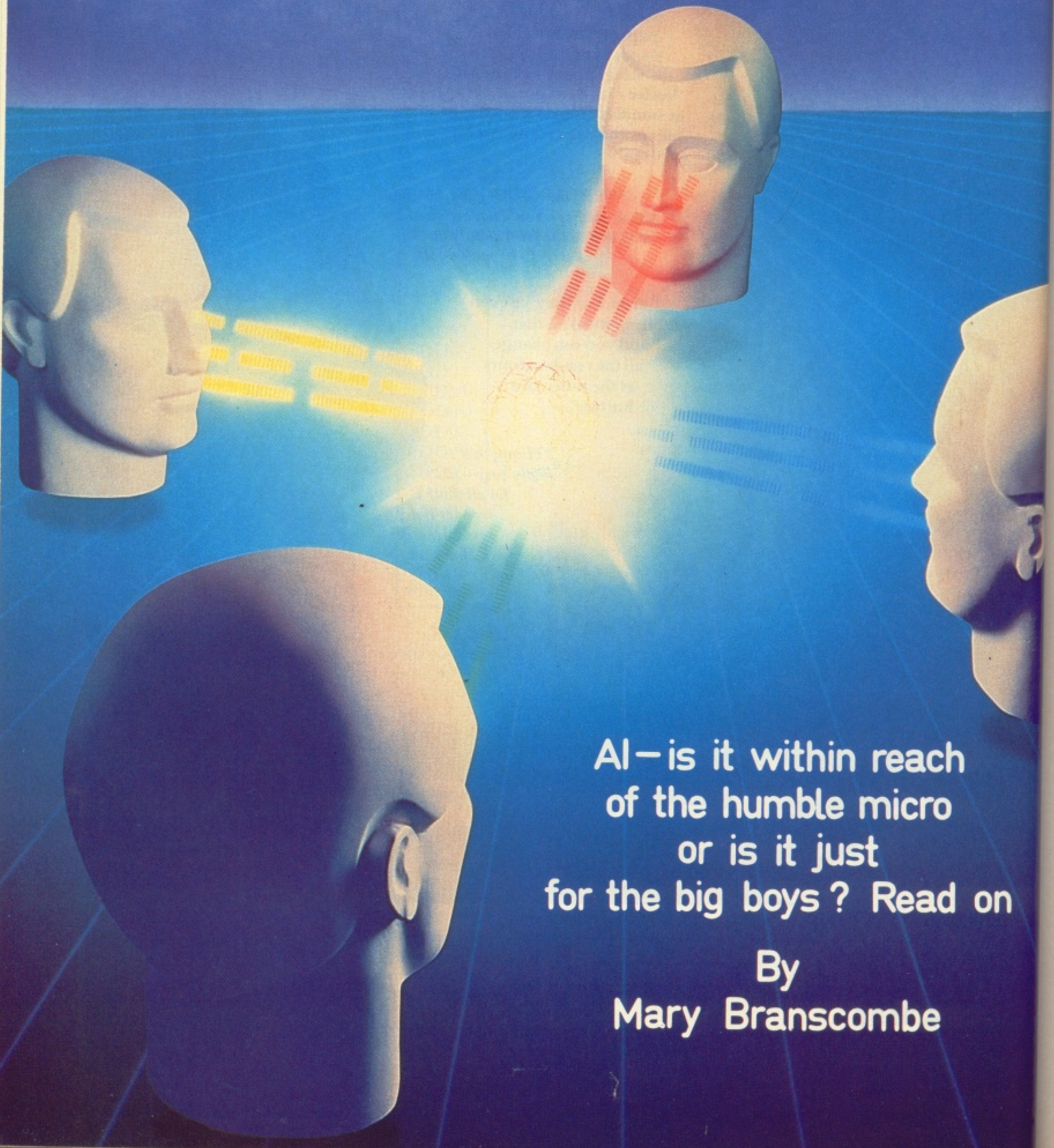
Address ______________

______________ *Postcode* ______________

Telephone ______________

LCYC2

ARTIFICIAL INTELLIGENCE



AI—is it within reach of the humble micro or is it just for the big boys? Read on

By Mary Branscombe

The problem with Artificial Intelligence (or AI as it is also known) is that it means a great many things to different people – certainly our demands on an AI system are likely to change as our conception of AI becomes more definite (or at least, less fuzzy!).

As a result, I have decided to concentrate on one particular language – LISP – the language central to the whole development of Artificial Intelligence and, more recently, as a core to the latest fourth generation languages – 4GLs for short. Of course there have been examples of other languages ideally suited for AI applications – namely Micro PROLOG and even operating systems such as SmallTalk for VAX and PDP computers, but these are derivative, and can be seen as having their roots firmly embedded in LISP.

LISP is a language of contrasts. As it is one of the first "academic" languages it is still looking forward, and because of its history as a good expert system generator, it has found itself enmeshed in the world of AI.

LISP has risen in popularity since its completion as a full mainframe compiler back in the seventies. Due to large amounts of money being poured into the design of a fifth generation computer, it is likely that within the next five years we will all be as familiar with an expert system as we are with the wordprocessor today. Already such commercial applications of AI research are in common use today, helping out on the factory floor, taking the strain and tedium from everyday working at a steel rolling mill as it controls the vital combination of air and heat.

A doctor has committed his lifelong working knowledge of brain growths to an expert system written using LISP as a front end processing package to analyze brain defects from a brain scan.

The applications in AI are all around us, and like the so called "silicon revolution", the acceptance of AI is taking place very quietly, not behind our backs, but right under our noses.

LISP on a Micro

So where do micro based LISP implementations come into all of this? And more to the point, what possible impact can a microcomputer based version of the language do in a field of computer science rapidly gaining momentum? The answer is, quite a lot.

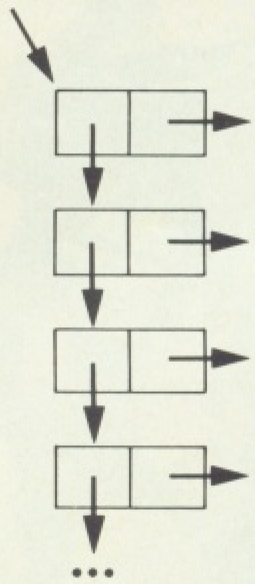
In order to look at AI, we have to look at the way we consider the outside world, the way we consider things that possess "intelligence" – one person's view of intelligence is likely to be directly at odds with another view. Some people think that the computer is "intelligent" when it plays a move in a game of chess, other people think such an approach is worse than moronic, but the fact is, it is still possible to program a computer to beat a world master at his own game!

Micro PROLOG is another language used in AI. It's a language designed to work on the same programming structures as LISP, that is using a system of logic commonly termed as predicate logic, but whereas micro PROLOG is better suited to the logical programming precepts we have grown to know and love in languages more down to earth such as Pascal and Comal. LISP has taken a radical new angle on the subject, one which has tremendous applications in the world of AI, and that is in "symbol manipulation".

It is many intelligent people's opinion that the one thing that makes us intelligent, is our ability to absorb symbols, find a common factor, and represent that symbol in another way. That is known as learning! When we get to the stage whereby we can make assumptions such as "the sun sets in the west" and so on, we are beginning to rely on sense data being fed to us, which we absorb and can postulate such theories as "either the sun, or the earth rotates around the other".

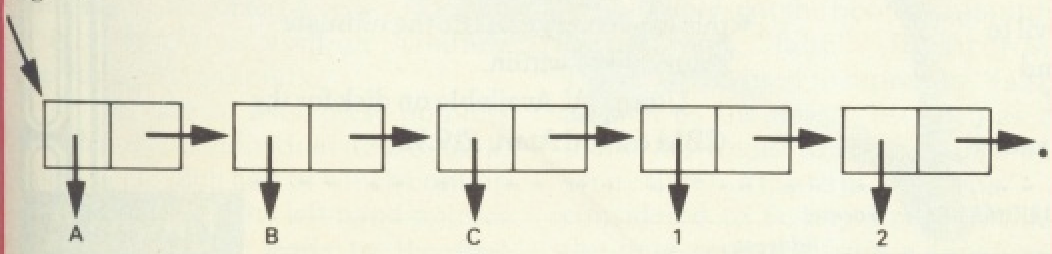
This is called "predicate learning" and is one of the greatest stumbling blocks in the world of computer science, because the next step we take will force our line of research in one direction or another. In order to achieve the "intelligent machine" we must make the right choice. Do we assume that "predicate learning" processes are achieved by a strict order by deductive process (so our reasoning and learning is made possible by a series of questions to which we are given input). On the other hand do we assume that the ability to manipulate huge quantities of symbols and re-package that information in another way is indicative of "intelligence".

Figure 2



Another concept is that of data trees – arrays of information stored and retrieved in such a way that makes it ideal for use in databases and Expert systems – nothing more than glorified databases.

Figure 1



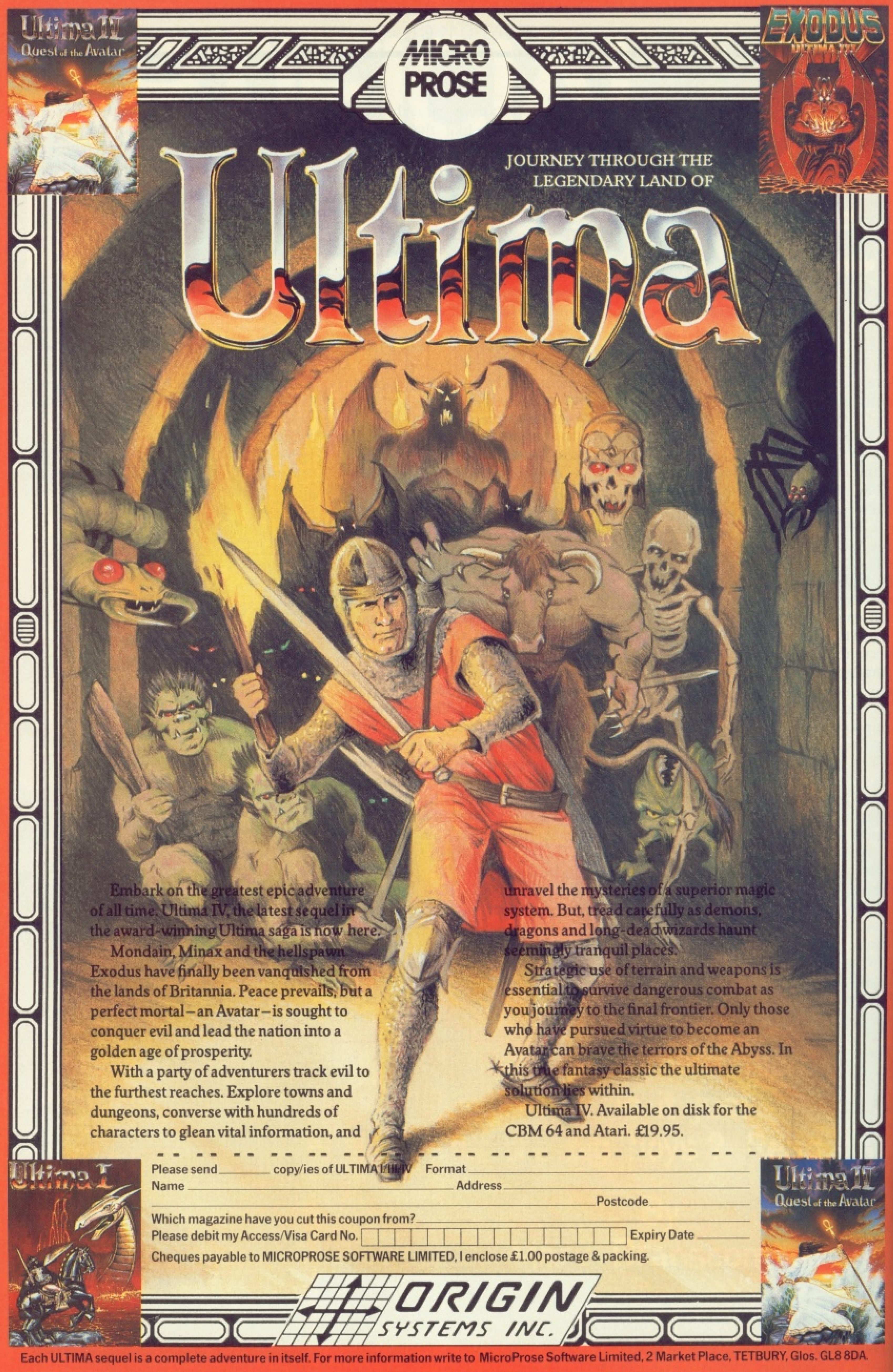
Data structure diagram of a typical sequential path written in LISP. This forms the heart of many lisp programs.

Quite a Problem

LISP is a computer language dedicated to symbol manipulation. It has a marginal ability to display alphanumeric characters and no doubt somebody could write an arcade game using the language, but the main strength of LISP is its ability to process large streams of data.

Physical Bodies

LISP is totally unlike BASIC in that it works on this series of predicates,



Ultima IV Quest of the Avatar
MICRO PROSE
EXODUS
JOURNEY THROUGH THE LEGENDARY LAND OF
Ultima
Embark on the greatest epic adventure of all time. Ultima IV, the latest sequel in the award-winning Ultima saga is now here.
Mondain, Minax and the hellspawn Exodus have finally been vanquished from the lands of Britannia. Peace prevails, but a perfect mortal – an Avatar – is sought to conquer evil and lead the nation into a golden age of prosperity.
With a party of adventurers track evil to the furthest reaches. Explore towns and dungeons, converse with hundreds of characters to glean vital information, and unravel the mysteries of a superior magic system. But, tread carefully as demons, dragons and long-dead wizards haunt seemingly tranquil places.
Strategic use of terrain and weapons is essential to survive dangerous combat as you journey to the final frontier. Only those who have pursued virtue to become an Avatar can brave the terrors of the Abyss. In this true fantasy classic the ultimate solution lies within.
Ultima IV. Available on disk for the CBM 64 and Atari. £19.95.
Ultima I
Please send ______ copy/ies of ULTIMA I/III/IV Format ______
Name ______ Address ______
Postcode ______
Which magazine have you cut this coupon from? ______
Please debit my Access/Visa Card No. ______ Expiry Date ______
Cheques payable to MICROPROSE SOFTWARE LIMITED, I enclose £1.00 postage & packing.
Ultima IV Quest of the Avatar
ORIGIN SYSTEMS INC.
Each ULTIMA sequel is a complete adventure in itself. For more information write to MicroProse Software Limited, 2 Market Place, TETBURY, Glos. GL8 8DA.

which is used by many of the new artificial intelligence languages, namely PROLOG, by typing in:

```
'COLOURS
'(RED WHITE BLUE)
```

LISP will reply by returning the literal data given which will be COLOURS and (RED WHITE BLUE), however if you took away the single quote symbol, the LISP interpreter will return the error message UNDEFINED. You can give a variable a name by typing in a variant using a command called SETQ, this gives a variable a value, a bit like the LET statement in BASIC.

```
(SETQ COLOURS '(RED WHITE
BLUE)
```

As can be seen, the value to be stored in the variable can be either a literal expression, (preceded by a quote mark) or a reference to a LISP function (known as a "command" or "key word" in BASIC). After entering the name of a variable without a quote mark the value assigned by the SETQ statement will be produced.

As with micro PROLOG, LISP requires a completely new approach to the way we program. To this extent LISP and micro PROLOG share many similarities, and even a few more in the language constructs itself, but we have to move away from the "sequential flow" that the flowchart has instilled in our programming ideologies and is forever being continued in programming languages such as BASIC, COMAL and the like.

Consider a list of information: it consists of a number of items, each of which, except the last, has a successor. LISP wishes to treat lists as a class of objects which can be referred to in a uniform way, irrespective of their length. The idea that lists can be traversed by stepping along them one element at a time helps greatly.

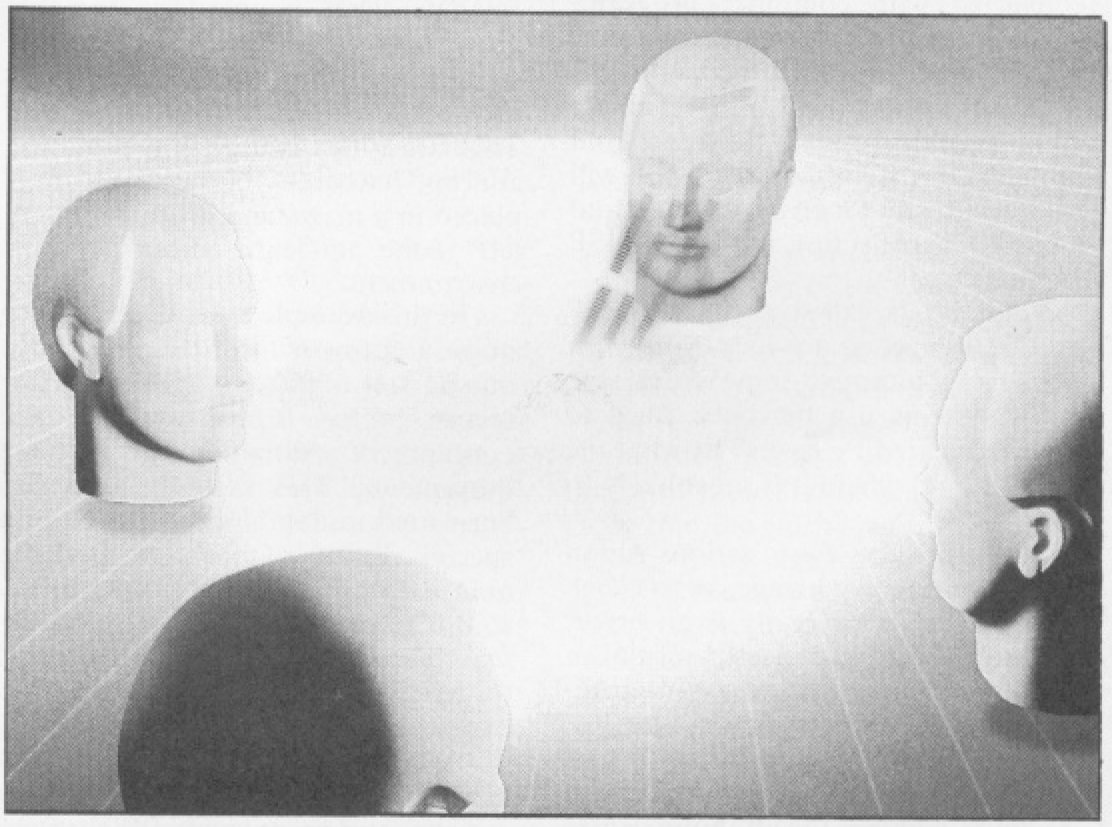
LISP also allows identifiers and numbers to be mixed freely with lists. It is a means in itself of handling everything via pointers.

In the case of lists, these pointers will identify an individual item of data, called a cell; each half of which contain another pointer. The left hand pointer (first in the cell) leads to the first element in the stored list, while the right hand one points to the remainder. So for the list (ABC12...) we get the picture in figure one. Such lists can be organised into sub lists or arbitrary depths, such as the illustration in figure two.

Now it is probably clear why LISP is such a good general purpose database generating language, as it has nearly all of the functions and data structures inherent in a database built in to the structure of the language.

Tests and Comparisons

The ability to define a function so that, by means of a simple call, structured information may be built, stored or retrieved, or arithmetic performed on an arbitrary piece of data, is a common feature of LISP. However, far more interesting programs can be produced once functions are written capable of using what some people might call



"intelligence", considering argument data from a function, and making decisions about what to do next on the basis of the functions findings. In other words LISP needs to make tests on and comparisons between data.

The most common tests, EQ, ATOM and NULL return values which represent the boolean quantities "true" and "false". In Acornsoft LISP, NIL is used to represent "false", as well as the empty list such as the blank list found at the end of a data structure diagram. "True" is considered to be any situation where the data returned from a function is not "false", thus we can use the word T to represent this quantity, (likewise F exists for its "false" counterpart).

LISP functions that are thought of as returning "true" values are known as predicates. Their main use is in conjunction with conditional expressions built up using the special function COND. The general form of such expressions are:

```
(COND)
  (predicate 1 expression 1)
  (predicate 2 expression 2)
  ...
  (T final expression)
```

There can be as many, or as few predicate expression pairs as required.

When LISP finds a COND expression, it starts evaluating the given predicates in order. The value it returns is that of the expression which is paired with the first predicate to yield a "true" (i.e. the first expression to be returned with a non NIL) value.

In the previous example, the constant T is used as a final predicate. Since this always has the value "true", the corresponding final expression can be seen as a default. The result to be returned in all of the other predicates is therefore "false". Thus, expressed without the brackets, the conditional form can be read as:

IF	predicate 1 is "true"
THEN	return the value of expression 1
ELSE IF	predicate 2 is "true"
...	
ELSE	return value of final expression

When LISP requires composite predicates, it can build them up using AND and OR. Each of these functions can cope with an arbitrary number of arguments. They evaluate these arguments one at a time until the

normal rules of logic allow them to return a result. Thus AND will evaluate arguments until it reaches the end of the list (and returns T) or until it finds that one of its arguments evaluates to NIL.

OR will stop evaluating and return T as soon as it finds a non NIL argument. Pieces of LISP code which seem to require a complex nest structures of COND, AND, OR and NOT are usually best re-written as groups of smaller functions.

The LISP System on a Micro

When you write a number of functions using LISP you are bound to make mistakes, after all that is part of the fun connected with computer programming. When LISP encounters an error, a number of things will occur.

Your answers will either end up making total nonsense (the worst kind of error), or, if you're lucky, you will be greeted with an error message, and a confusing collection and list of LISP expressions.

This list is called a "back trace" and is supposed to help you with debugging, although some mainframe LISP systems use the back trace to make educated "guesses" at what the error is, and where it is most likely to be.

One of the first actions upon getting an error message, is to check whether the error really is an error, and not just an unexpected result, an entirely virtuous human misinterpretation on behalf of the computer.

Once you have traced the logic of the program by using the data structure diagram (as all things centre round the data, the integrity of the data is the second thing to be considered at fault). The fun really begins, and where LISP, thankfully enough abounds at being able to help in isolating an error, as you can examine all of the quantities ever passed to LISP functions and all the values that can ever get returned as results can be read and printed.

The only time when you cannot examine the integrity of the function is where problems occur with function entry points and with re-entrant structures such as breaking out of a loop structure by direct means, (a bit like issuing a GOTO inside a FOR NEXT loop).

When all else fails, it is time to pull in the heavy mob, in the form of a function called TRACE. This can be used to see how values get passed between functions in a complex calculation. Again, the object of using it is to isolate a single function returning incorrect results, and to exhibit arguments which lead to bad behaviour.

If the bad function is a simple mistake, then it will be easy to correct the error, save the program and try again. However, if all else fails, then all that is left open to the programmer is a long night sitting over a dry run chart and a lot of paper.

LISP and AI

AI consists of a number of apparently diverse areas, some of which have been hinted at. One in particular was the analysis of data trees and a simple type of game. This can be taken further. Imagine what happens as the tree grows bigger, the number of branches so great that they start to interact, to produce a loop in the tree structure. This latest idea is used in the "mouse concept" whereby a small robot is placed in a maze, and is quite literally left alone to learn about its new environment.

In this example the mouse is left to make a pathway in order to get from one part of a maze to another. If this seems pretty futile, examine the concepts of examining the possible movements. This same concept has been used in databases and even in a special version of chess, to find the quickest way of getting from point A to B. This could be used to develop fast search operations (LISP has been used to write wordprocessors and screen editors in its past).

A famous LISP program, written mainly as a joke has become a notorious addition to any LISP system and is great for breaking the ice at parties! Called ELIZA, it is a simple question and answer session between a computer and its operator, sometimes the results can be stunning:

Operator:	My father hated me.
Computer:	Tell me more about your family.
Operator:	I remember my unhappy childhood.
Computer:	Do you often think of your unhappy child-hood?
Operator:	No, I can't.
Computer:	Tell me why you can't.

This is a section from a typical LISP dialogue, and as you can see, the operator is already opening up his heart to what is essentially a plastic box with a TV on top of it!

I would be surprised if ELIZA has any therapeutic value, especially as the operator eventually gets annoyed at the lack of feedback, just questions and no answers; but to begin with, we are willing to tell all, to convince ourselves that there is a compassionate, thinking behind the computer screen and the results tell us a lot more about our demands from AI than what we originally think.

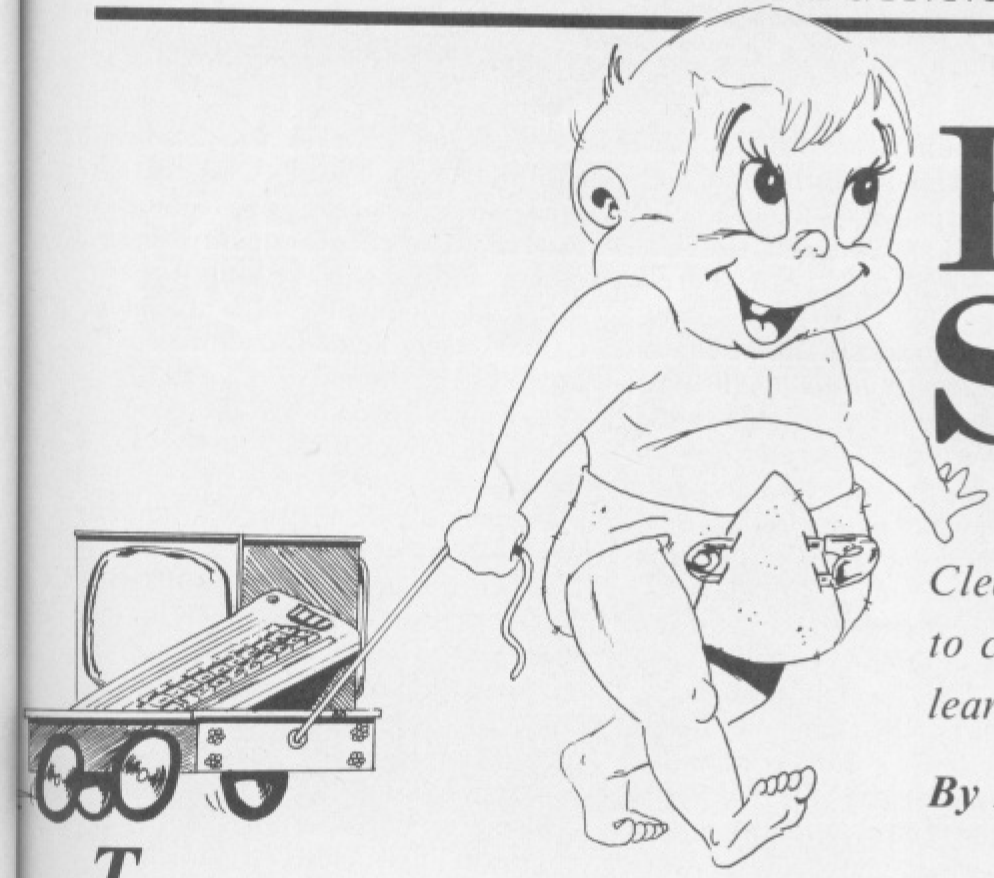
I hope that this proves my last point. The fact that AI also relies on the fact that we are willing to attribute intelligence to a series of rules and statements for at least some of the time. Regardless of how a piece of software is written, if it at least gives the appearance of behaving intelligently, that is enough for some.

LISP will not turn your computer into a silicon prodigy, nor will it even hope to compete with complex applications such as sentence and word structure analysis (as is being researched by the Lotus corporation for a "context checker" to check sentence structure for bad use of the English language) but what LISP will allow is some fairly comprehensive database and list processing programs to be written.

In addition to this, LISP is perfectly capable of supporting a full parser for direct text entry, so it may find itself applications in expert systems and simulation and modelling programs that require aspects of the real world to be simulated. Again LISP is the ideal front end for this as nearly 70 per cent of the functions deal exclusively with conditional comparisons.

I have seen a chess program being written using LISP. Although this is purely an exercise, it should give an indication as to just how serious applications can be written using LISP.

For more down to earth applications – or at least those which are more suited to the micros with LISP are for writing computer adventures, and with its advanced features (found normally only on compilers such as "Golden Common LISP" for the IBM PC and MS DOS machines, or MAC LISP for the Macintosh, or even Cambridge LISP for generic 32016 processors) a good deal more than just fun and games are possible. Not to mention educational establishments that are waiting to teach microcomputer based, predicate programming structures in LISP to College and University students.



First Steps

Clear thinking and cleanliness form the key to creating a suitable environment for learning about your computer

By Norman Doyle

The normal reaction to change is resistance – there's a luddite in everyone just bursting to get out. Change, not necessarily progress, is inevitable and the machines of the *New Age* roll on relentlessly.

A major stumbling block to the layman is the fact that once initiated into the mysteries of the new, the experts proceed to slam the door and bar it with mounds of jargon. Familiar everyday operations gain strange and new games, the commonplace becomes ritualised into ceremony. Take the simple act of turning on the computer. If it were a television or a light it would simply be switched on but computers are powered up, booted or placed into operational mode. Like the inner sanctum of a temple, a veil of terminology hides the holy of holies from the common man.

Fear and curiosity are the driving forces of change and computer technologists have followed the tried and tested route to exclusivity by relying on technofear and thick volumes of computerspeak to bar the path to the uninitiated. Even as a technically minded person it took me many years to pluck up the courage to delve into computers and immediately confusion descended.

By way of a tunnel into this great bastion of the computer age this series of articles will take you back to the very basics and drag you kicking and screaming into this brave new world.

Presumably, you have already taken the first step of buying a computer. Probably the choice was made principally on the basis of financial restraints and ego. The machine would be accompanied by an 'easy' introduction to computers but the volumes of introductory books available belies the myth that one book is all you need.

Inside the machine there are dozens of delicate electronic circuits but few books deal with routine maintenance. The current fashion for matt finished cream and grey plastics means that it is not long before your shiny, new acquisition becomes a grubby, coffee stained dust trap. A quick flick of a feather duster may remove the surface dust but the computer is riddled with holes for ventilation, sockets and spaces between the keyboard buttons which all let in dust.

If you've never had the urge to examine the innards of your Commodore I suggest that you disconnect it from the mains, let it cool if it's been used recently, and carefully remove the lid. What will you see? Dust.

At least once a year you should give your computer a spring clean. The circuits operate on very low voltages and dust can form an extra electrical pathway which may eventually lead to trouble. Circuits are delicate and coated in a protective skin of laquer. This jacket is just like the Teflon on a new non-stick pan; rub too hard and it won't last long.

The best way to remove dust is to use a puffer brush such as the type sold in most photographic stores. The use of a compressed air aerosol can be useful for inaccessible areas but take care not to spray directly onto the circuit board. The compressed gas often liquifies under pressure and a damaging spray of ice cold liquid can emerge if the container is held at the wrong angle. Always follow the instructions given on the can and select an aerosol with a flexible nozzle extension to avoid trouble.

The outside of the casing provides its own problems. Even the cleanest hands produce protective oils and grease which can prove stubborn to remove. Used frequently, a cloth dampened in soapy water will remove most of these stains. Make absolutely sure that the cloth is only damp to the touch if any water leaks inside to the circuits you may end up wih a clean but inoperative machine. Stubborn stains can be removed with a non-abrasive cream but again ensure that only the absolute minimum is applied and clean if off with a dry or slightly damp cloth.

The connection ports (sockets) provide their own problems. If you don't have a fixed work area where the computer system can be permanently connected, the ports will receive more than their fair share of wear and tear. Even under perfect conditions the use of cartridges, modems and other equipment will result in the gradual wearing down of the connector strips. Always ensure that these are clean and grease free because any grit will aggravate the problem. The best applications for this purpose is methylated spirits or even lighter fuel. Both of these are highly flammable liquids and must be kept away from naked flames.

The C16 and Plus/4 have their own problems because all the connectors have flimsy miniaturised DIN plugs. The tiny pins can shear off if too much force is applied and constant plugging in and unplugging increases the

possibility of damage. Once inserted they hold very well and I would recommend leaving everything connected whenever possible. NEVER force one of these plugs. If it won't go in easily, examine it carefully and gently straighten any pins which are misaligned but be warned, too much force will easily snap them off.

Peripheral Perfection

Cassette recorders and disk drives are both liable to additional problems due to the dirty medium which they use – magnetic coated film – and because they produce temporary magnetic fields in the presence of magnetisable materials.

The cassette recorder pulls a long strip of magnetic oxide across a small recording head with an even smaller slit in it. As the tape moves across this strip an ever changing magnetic field affects the particles on the tape. The magnetic forces are created by electrical impulses from the computer. If you consider each particle to be like a small magnet, it is magnetised in the direction of the magnetic field at the particular instant it crosses the gap. The field is changing all the time and the faster the tape passes the head, the more particles are affected and the more detailed the transferred information will be. With many thousands of particles the field is 'mapped' accurately and when the tape passes across the head in play mode these patterns excite the circuitry to recreate the original electrical impulses which created them.

To get a good transfer the tape must be in close contact with the head. This causes wear on both the head and the tape resulting in oxide being dumped on the head and seriously affecting the small magnetic fields. This is more serious when reading the tape back in because the recording process is inefficient and the stored magnetic field is many times weaker than that which created it. The presence of the particles creates 'noise' (stray magnetic effects) and reading the tape can be like listening to a whisper in a noisy factory.

Head cleaning tapes should be used frequently to have any effect. Leave it too long and you'll have to use a solvent to remove the stubborn accumulations of oxide. Cheaper tapes shed oxide more readily so forking out the extra few pence for quality can save money and time in the long run.

Head alignment is also crucial but is now easily remedied with a good head alignment kit. Azimuth alignment is just the jargon term for this and the problem is caused because the head only has to move by a fraction of an inch to affect the tape's legibility – it's like trying to understand a book by reading diagonally across the page.

The same problems apply to disk drives and the solution to the accumulation of oxides is similar to the one for cassette problems but alignment is really a job for the professional with an oscilloscope and not one to be undertaken under any circumstances. Head alignment kits are available but can cause more problems than they solve in the wrong hands.

Dust, smoke and carelessness are, and always have been, the greatest cause of computer faults. Cleanliness and thoughtfulness will set the scene for carefree computing. YC

MUSIC GRADE EXAM TIME?

You need trained ears for music exams — Perfect Fourth AURAL trains ears.

In every music grade examination, a section is devoted to ear testing which is called an aural test. Lack of practise in this section can profoundly effect the whole examination result.

Aural tests are the only part of the grade exams where the student can not practice alone. A skilled pianist is essential. Without this help, you will be entering the exams with a gap in preparation with the result that confidence is sapped. And nervousness can adversely affect the whole performance.

The result? A missed distinction or merit, but even worse..... overall failure.

And this tragic state of affairs is *not the fault of the student.* If no pianist is available to help, then you can't practise aural, having to rely on snatched moments from the weekly music lesson.

Daily practise is the only certain answer.

Recognising this urgent need, Perfect Fourth AURAL was created by a practising music teacher. Today you can practice aural daily in your own home, totally without help.

Perfect Fourth AURAL is a remarkable computer program designed to be used on Commodore 64/128, *needing absolutely no computer or piano skills at all.* If you can play a game -you can use AURAL.

Not only is AURAL intelligent - it will randomly select one of over 250 different tests available on each program - it will even show you how to conduct with cleverly synchronised graphics. This program is field-tested and has already helped students to play with much more confidence and greatly improved results.

This is what top teachers and performers say about Perfect Fourth AURAL.

GRAHAM LYONS, Performer, composer, teacher and author of the highly successful tutor, Take Up The Clarinet. *"It's fun. I wish this package had been available years ago."*

JANE PICKLES, Principal flautist BBC Concert Orchestra *"the answer to many a harrassed instrumental teachers prayer..."*

DAVID FARNON MA(Cantab) ARCM, Composer, Conductor, Performer and Teacher. *"...an excellent approach to aural training."*

Available now for Commodore 64/128
Prices include VAT and U.K. delivery.

Grades 1 and 2 on one tape	£16.65
Grades 1 and 2 on 1 disk 5¼"	£18.45
Grades 3, 4 and 5 separately each tape	£14.85
each disk	£16.65

NAME (PLEASE PRINT) ______

ADDRESS ______

INSTRUMENT(s) ______

GRADE	TAPE/ DISK SIZE	COMPUTER TYPE	QTY	UNIT PRICE	TOTAL PRICE
				TOTAL PRICE	
				TOTAL REMITTANCE ENCLOSED	

NO STAMP REQUIRED
CHEQUES P/O PAYABLE TO PERFECT FOURTH SOFTWARE

PERFECT FOURTH SOFTWARE

Perfect Fourth Software
Freepost MK 1008, Buckingham MK18 7YY
Telephone:(04427 6311)

MAIL ORDER ADVERTISING

British Code of Advertising Practice

Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days,the purchaser's money must be refunded. Please retain proof of postage/despatch, as this may be needed.

Mail Order Protection Scheme

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery, Argus Specialist Publications Ltd will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of this publication, summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day.

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent (up to a limit of £2,000 per annum for any one Advertiser so affected and up to £6,000 per annum in respect of all insolvent Advertisers. Claims may be paid for higher amounts, or when the above procedure has not been complied with, at the discretion of this publication but we do not guarantee to do so in view of the need to set some limit to this commitment and to learn quickly of readers' difficulties).

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine (not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements). Classified advertisements are excluded.

Sonus MIDI *Music*

When many companies seem to be forsaking the music potential of the Commodore 64 for the bright lights of the Atari ST, it's encouraging to find a company like Sonus with more Commodore MIDI products than all the other companies put together

By Ian Waugh

Sonus are a relatively new company in the UK, having set up offices here just too late to get a stand at last year's British Music Fair. They are a well known and much respected name in America, and they have no less than 18 MIDI programs and two MIDI Interfaces for the Commodore.



The Hardware

Let's get straight down to business and look at the hardware side of any MIDI set-up – the Interface. Sonus's Standard MIDI Interface has a MIDI In and two MIDI Outs. It's well constructed and housed in a sturdy black plastic case which plugs into the Cartridge Port. Sonus's other Interface has tape sync. For serious recording with a multi-track tape recorder you will need some sort of sync to tape facility to allow you to overdub a number of parts onto tape while maintaining sync with each other.

When you have more than two pieces of MIDI equipment you may need to consider a Thru Box such as Sonus's 2 In 8 Out MT70. It can help make more sense of all those MIDI connections.

The manuals say Sonus's software will run with Syntec, Passport, Yamaha (not generally available in the UK) and Sequential MIDI Interfaces and, in fact it should also run with Datel, SIEL, Jellingaus and Steinberg models, too, but it's best to check to make sure.

Super Sequencer

We'll begin with the biggy – the Super Sequencer. There are two versions available, one for the 64 and one for the 128. The 128 version takes advantage of the extra memory and it doesn't cost a penny more. All the other Sonus programs will work on the 128 in 64 mode.

Super Sequencer operates very much like an audio tape recorder, a method of working with which most musicians are familiar. They are Play, Record, Fast Forward and Rewind controls. You can create up to eight tracks of 16 sequences which can be chained together to form a song, and up to four songs can be stored in memory at once although they can only be made up from the one set of 16 sequences.

There is one main screen in which all the recording and editing takes place and another screen in which songs are constructed. Along the bottom of the screen are four menu options which are selected with the function keys. These have up to four levels depending on whether you press the function key alone, with Shift, CTRL or Shift and CTRL. It can appear overwhelming at first but they are arranged fairly logically and a little use soon breeds familiarity. I would have preferred to be able to access all the functions with just one hand, though.

Super Sequencer lets you select three PPQN (pulses per quarter note) values which give different recording resolutions (although the smaller values will usually be quite adequate). You can drive a drum machine via the MIDI Clock or the sequencer can be driven by an external clock.

Super Sequencer has virtually every facility you would expect to find in a professional MIDI sequencer program. The exact lengths of

sequences are easy to set and each sequence can have a different tempo. Tracks and sequences can be named – very useful – and given individual channel and velocity settings. You can also filter out unwanted MIDI data.

Counters can be used to set auto punch in and out points, and tracks can be bounced down to create a backup track or to free a track so more recording can be done.

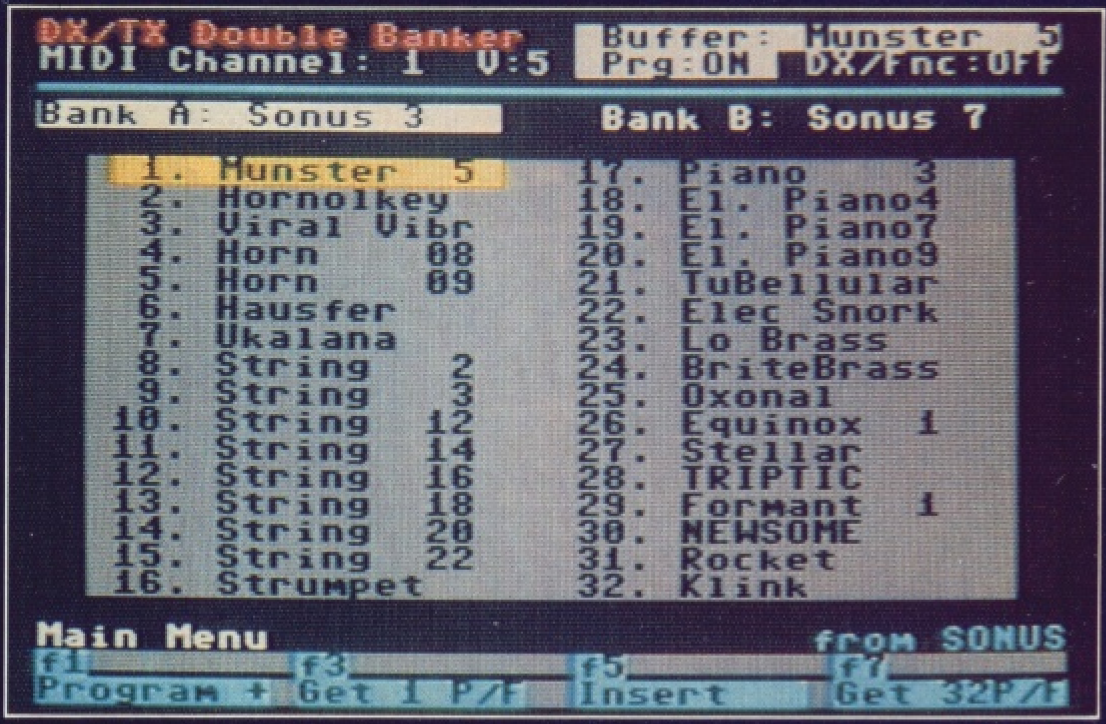
The Track Menu features Auto Correction with a resolution of up to 32-note triplets. Tracks can be transposed and shifted back and forward in time to compensate for timing errors.

Sequences can be appended to themselves or other sequences, transposed and shifted. In the song screen, up to 24 sequences can be chained together. Each sequence can be set to repeat up to nine times and given its own transposition and auto-mute setting. This allows you to choose only to play selected tracks in the eight-track sequence.

Other features include Omni Off send (for those synthesisers which always start up in Omni mode), a Seam Manager to tidy up the end of a section and Play Through to allow your master keyboard to play another instrument on a different channel.

There are step-time facilities, too. The Return Key can be programmed to step the clock on by a set amount and used to move through the recording. It's simple, perhaps not an ideal method, but it's effective.

Super Sequencer even features a



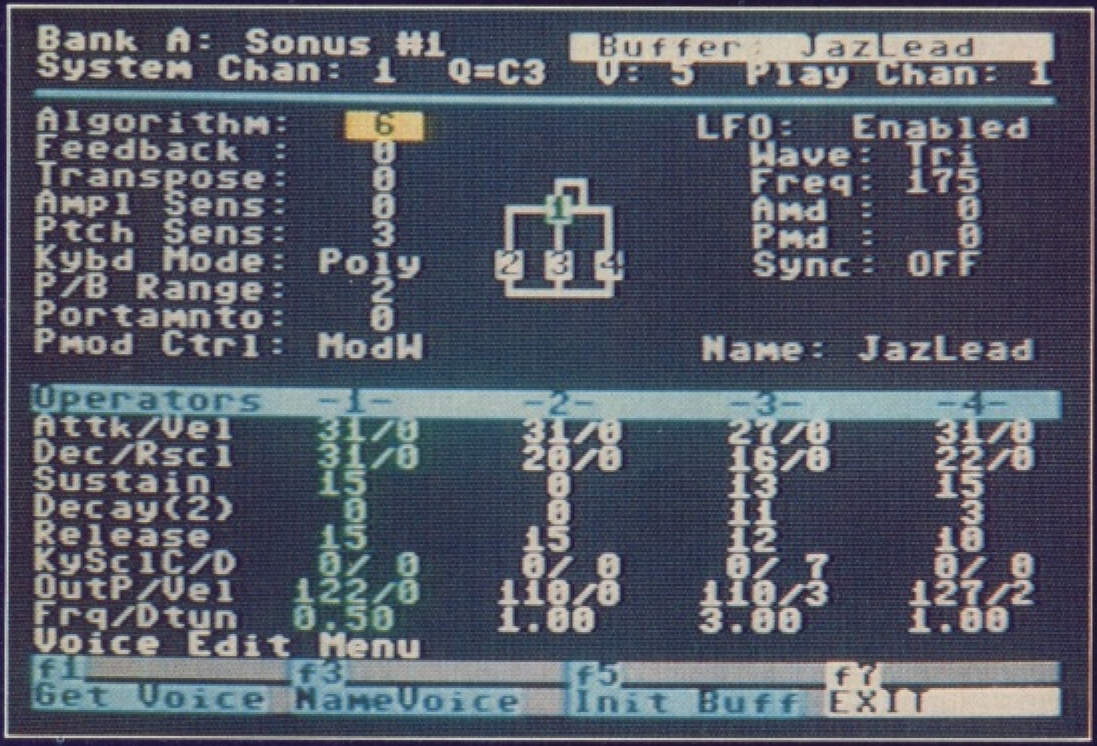
System Exclusive Dump which can save and store drum machine patterns, voice settings or sample data (although it's doubtful if the Commodore would have enough memory to hold much sample data), providing the equipment can transmit it. This would allow you to save all the necessary information for a song on one disk.

The manual is excellent and explains all the functions clearly. There are so many features, however, that a crib card is included to help you find your way around.

Glass Tracks

The intriguingly named Glass Tracks is very similar to the Super Sequencer and shares many of its editing, recording and MIDI functions (but not the system Exclusive Dump). Glass Tracks, however, only allows you to construct one 16-element song made up from eight sequences of eight tracks each. A single sequence can't repeat or be transposed. Altogether Glass Tracks is not as powerful or flexible as the Super Sequencer but then it is less than half its price and it will comfortably handle many applications.

The screen layout and menu-driven functions operate in the same way and you can swap files between programs. The program disk contains some excellent demos. Glass Tracks would be an ideal program if you didn't want to commit yourself to the price of a Super Sequencer. It, too, has an excellent manual.



Personal Musician

If you're still not convinced that making music with MIDI can be both easy and fun then Sonus's Personal Musician may be worth looking at. It's a complete package containing easy-to-use software and a MIDI Interface plus cables.

It was designed for entry-level users yet still maintains file compatibility with Sonus's more comprehensive programs. The manual includes 'Introduction to MIDI' and 'Synthesiser' sections and the program disk contains a selection of Christmas carols (better late than never) as well as other demo tunes.

MIDI Processor 64

All in all, the Sonus sequencers are excellent programs. The Super Sequencer is certainly the most comprehensive, but it's main omission is the lack of a note editor. Now, such editing involves getting down to the bits and bytes of MIDI data and may not appeal to everyone but it could save a lot of time and trouble if, for example, you needed to correct just one note in an otherwise perfect sequence. Such an error in an audio recording would require a re-take or a punch in and you can use the Super Sequencer's auto punch in features to do this.

Sonus's MIDI Processor, however, lets you do this and more. It is a stand-alone program but it can load and save sequencer files. It can be used to examine MIDI data and remove unwanted program changes, pitch and mod wheel data. It can also 'un-bounce'; a process which involves extracting information on a given channel and putting it on another track.

It has its own mini-sequencer so you can record additional tracks and add them to your piece although its main purpose is to test the results of your edits. The Range Edit feature lets you work on just a range of events rather than a complete track or sequence.

MidiTech 64

Sonus describe MidiTech as a monitor/system exclusive librarian. It is to MIDI data what an assembler/monitor is to machine code. We're really down among the bits and the bytes in MidiTech as most information is displayed in hex which should give computer users less of a headache than musicians.

MidiTech can be used as a diagnostic aid to check suspect MIDI data or to edit it. You could, for example, load in a Super Sequencer file, edit note or event information and resave it. Not the easiest way of doing things, I admit, but it illustrates the potential.

More practically, it can be used to initiate a MIDI dump request from instruments without a manual dump sent on their front panel such as Casio's CZ-101. 11 Dump Requests are included on the program disk.

MidiTech also has a 128 byte Trigger Buffer which holds a series of data it must receive before it begins recording MIDI data. This would be used to start data reception after a certain event had been enabled such as the use of a mod wheel or a program change.

There are selectable MIDI filters, captive Play Through and editing features.

MidiTech is a fascinating program, unlike any other MIDI program I've seen. The average – and even the super-average musician may never need to use its facilities as the MIDI Processor should fill their needs. A MIDI technician, however, or data buff will have a field day and somehow it's reassuring to know that a program like this exists. You may just need it one day.

Score Track

Most MIDI sequencing programs display the music they record as a series of numbers. They are generally quite easy to edit but it's often useful to be able to see the music in traditional notation.

Score Track does just that. In fact, it's a self-contained sequencer program with real and step-time input. It was written by Gerhard Lengeling who wrote C-Lab's programs and it betrays its roots by displaying a C-Lab logo in the Edit screen. Operation is with single key commands – as opposed to Sonus's multi-menu system – and it's a very easy program to use.

You can record 64 Patterns each with up to 16 tracks and arrange them into a Song containing up to 256 Pattern Positions. There is a muting function so the same pattern can be used in different positions with different tracks playing.

The disk contains a converter program so you can load Super Sequencer files. There are facilities such as track copying and bouncing, quantisation, transposition, ghost tracks and various delay options to get tracks and drum machines in sync.

Recording takes place in the Song and Pattern screen. To see a track in traditional notation you go to the Edit screen. The music is shown on a treble and bass clef and beneath the stave are options to alter various parameters which affect the display. These include quantisation, minimum note length, legato (to avoid chords forming during minimal overlapping), staccato (to set the minimum rest length) and transpose. The screen updates after each keypress and you can see how the alterations affect the music.

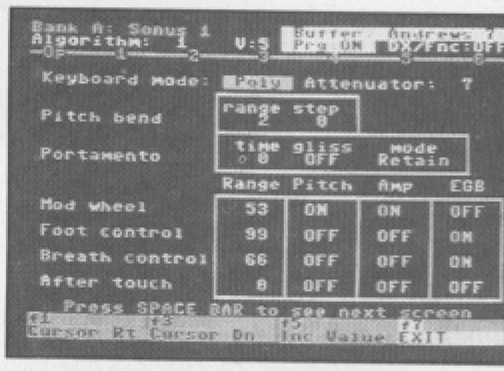
Beneath the stave is an event editor which shows the time of the start of the event, the note name and duration if it's a note or any associated parameters if it's not. The cursor on the stave is linked to one in the event editor so you always see how the two fit together.

You can enter, insert and delete notes and events and although you can write a piece directly to the stave (principally by directly inserting notes) if you can find your way around a keyboard you can probably enter a piece just as easily in step-time from the Pattern screen.

The print out is basically a dump of what's on the screen.

Unfortunately, the stave has a range of only four octaves and although notes outside this range are shown in the event editor they appear on the stave as rests and are printed as such.

In spite of its limitations – there is a limit to what you can cram into a 64K, after all – Score Track is a nice program and if you like to see your music in traditional form – as I do – it can be recommended.



Voice Editors

Sonus have a range of voice editors for many of the most popular synthesisers on the market. Voice editors serve three functions. Firstly, as most synths are digital, programming new sounds normally requires the adjustment of dozens (possibly hundreds) of numeric parameters. Quite often the only display on the synth is a small LCD which can only show the value of one parameter at a time. With these restrictions, it's not easy trying to work out how a sound is constructed.

Software can help by showing all the parameters together on one screen – or several screens if the synth has so many parameters – and by translating some of the numbers into graphs – envelope and waveform shapes, for example.

Secondly, the voices on most synths are arranged in banks and you will often want to load a selection of voices into a bank in a particular order. Trying to arrange voices in this way on the actual synth can be very hard work indeed but with a computer it's a doddle.

Thirdly, voice editors let you save voice data to disk. The usual method of storage is a plug-in RAM pack or a dump to a cassette. In terms of sheer convenience – and a saving in RAM packs – a voice editor can soon pay for itself several times over.

Casio Programmer Librarian

Like Sonus's other programs, their CZ/PL (Casio CZ Programmer/Librarian) is driven from a series of menus called up with the function keys, Shift and CTRL. The program can store two banks of 16 voices and has an edit buffer. You can load and save voices to and from these, the CZ synth and disk. The program's banks are called Cartridges, not to be confused with the CZ's RAM cartridge.

You can swap voices from bank to bank and buffer to buffer with the press of a few keys. Some of these swaps are activated from sub-levels of the menu and require three key presses to activate and then a confirmative Y or N so you don't overwrite. You do get used to the system after a while, especially after using the Sonus sequencers but I wonder if a slightly different approach could have made the process simpler.

The Edit screen shows all the numeric parameters at a glance although you have to press Space to swap between DC01 and DC02. The layout is not arranged in the same order as the synth or the Casio CZ patch charts – and hence the normally accepted method of writing voice parameters – and slight though the difference is, it makes copying patches from charts just that shade more difficult. The data is illustrated purely as numbers – there are no graphs, unfortunately – but, to be fair, although some voice editors have graphs, most don't.

However, once you get the hang of things – and a little familiarity goes a long way – the program can aid programming enormously.

Compared with the price of RAM cartridges, the program cost will quickly be recouped as you can save any number of banks of voices conveniently to disk. The CZ/PL disk contains 10 banks of 16 voices so that's a nice plus. Casio Digital Disks are also available containing 10 more banks of voices and you can buy patch charts from various sources which you can type into the program.

DX-TX Design

If you have a Yamaha DX or TX 7, 216 or 816 synth or expander then the DX-TX Double Banked Librarian & Programmer – to give it its full title – does for these instruments what the CZ/PL does for the Casio CZ synths.

It uses the same sort of function key menu system and displays the parameters numerically over three screens – darned full of parameters these DX/TX thingies! It can hold two banks of 32 sounds and includes an AB compare feature. The disk contains eight banks of 32 sounds and a DX-TX Digitial Disk is available containing over 500 sounds.

FB-01 Design

If you have a Yamaha FB-01 and want to program your own voices then you *must* have some software to do it as the FB-01 lacks the necessary buttons to be programmed by itself.

FB-01 Design retains the Sonus function key menu features and lets you do to the FB-01 what the other editors let you do to their respective instruments.

ESQ-1 Design, TX816 Design and DX21,27,100 Support programs

These cater for Ensoniq's ESQ-1 Synthesiser, Yamaha's TXB1Z expander module and Yamaha's 4-operator DX21 DX27 and DX100 synthesisers.

RX11/21 Librarian

Here's something slightly different – a librarian for a drum machine. The program contains over 150 patterns including jazz, latin and rock sets. You can edit and store patterns and mixes and add a 20-line comment to individual patterns.

It is menu driven, Sonus style and displays a grid showing which patterns have been recorded. There are no facilities for composing new patterns or songs which is a shame – it is purely a Librarian after all – but it is more useful and convenient than storing songs on tape.

Sonic Editors

Two of Sonus's most recent programs are Sonic Editors for the Ensoniq Mirage and Sequential's Prophet. These are menu-driven waveform editors which display wavesample and program parameters and let you step through the samples page by page to find the best looping points. You can also draw your own waveforms directly into the system.

You can store sets of 78 sounds (each containing a single page waveform and 36 preset parameters) on a disk and a library of 78 pre-programmed sounds are provided.

Sonus Demo Disk

Finally, if you prefer your information to be presented visually, then the Demo Disk lists the features and gives you screen shots of eight of the main Sonus programs. None are interactive, however, but you can take advantage of Sonus's special 14-day money back guarantee to make sure that the program you buy does what you want it to do. Contact Sonus for more details.

Summary

The Sonus programs are well-conceived pieces of software although some of the Voice Editors, though functional, could have been more inspiring. The Sequencers and Score Track especially are certainly worth a close look if you're after your first piece of MIDI sequencing software.

You can see that Sonus are dedicated to supporting the Commodore's music potential. Write to them for more details of their products or speak to Rosemary, one of the most helpful people in the biz on the other side of a telephone. Sonus have many special offers if you buy two or more of their products.

The Commodore 64 and 128 still have a lot going for them in the music stakes and the availability of the Sonus range of software will hopefully encourage anyone who has not yet taken the plunge into MIDI music to do so.

Touchline:

Supplier: *Sonus UK, P.O. Box 18, Wokingham, Berkshire, RG11 4BP.*
Tel: *0734 792699.(Contact for prices.)*

Extended Backgrounds

Extended background mode opens up many possibilities but only allows the use of 64 characters. Until now...

By Paul Williams

The Commodore 64 has many different graphics modes but the least publicised is the extended background mode. This enables characters to have background colours which differ from the selected backgrounds but only permits 64 characters to be defined.

This sort code program allows any text or user-defined graphics mode to have a unique background colour for each of the 25 screen lines, but still allows the use of the full 256 characters in the character set. It works by intercepting the television raster scan so that values in the VIC chip can be altered.

To use the routine once it has been loaded with the Basic loader program, Extended Loader, call SYS 49152. The 25 line background colours are then defined by the values of locations 832 to 856 in memory; POKEing to these locations will instantly change the background colour of the corresponding screen line. Foreground colours are set in the same way as before – either using the control-colour keys within PRINT statements or by POKEing to the colour map at 55296 to 562295.

To demonstrate the use of this mode, you can type in Extended Demo and see what it does.

See listing on page 94

Gyrospeed

C64 tape turbo

By Gary Saunders

Transfer your existing single part programs (Basic or machine code) from tape or disk to turbo tape with Gyrospeed turbo tabe facility. Any BASIC program can be handled easily but machine code files should not load into locations 1024 to 2048 and 57344 to 62464. Apart from that, you should have no problems. The final program can then be loaded from tape up to ten times the normal speed. For disk users I've included a directory function, which no doubt, will come in handy, i.e. to find the start address of a specified program.

The title screen has three options to choose from: F1 takes you to the loading menu screen. Now follow the on-screen instructions to load your required program stating the filename and if using tape or disk where requested. Machine code programs also need the run address, this being the SYS address which starts the program, e.g. a machine code program which loads into location 49152 onwards is normally started with SYS 49152 etc...

For disk users it is a good idea to make sure that all SYS calls to machine code files call the start address as in the example above. You then won't have to remember all those SYS calls as the directory functions will list all PRG type files with their start addresses in memory.

Once the required program has loaded, pressing space will return you to the title screen. F3 will now save the program to tape in turbo format. Once saved you can return back to the title screen to save more copies if necessary or load either programs or use F5 to quit the program. All turbo programs will autorun when loaded.

Getting it all in

The program is presented in the form of a BASIC loader and should be either typed or loaded in after the following line has been typed:

POKE 43,1:POKE 44,32:POKE 8192,0:NEW

Once run, the BASIC loader will generate another BASIC type file called 'Gyrospeed' and save it on to disk. If using tape then read the REM statements in the program.

The program can then be loaded like an ordinary BASIC program.

See listing on page 86

CP/M Assembly Language Programming

An in-depth look at the CP/M+ Operating System

By Paul Schofield

If you are a regular reader of *Your Commodore*, you should already know about many of the features offered by the CP/M+ Operating System. If this has prompted you to experiment, you are now no doubt well aware, that after booting CP/M, all you see on the screen is A > . This is not terribly informative, so we are now going to use a simple little program that will make CP/M display a menu of the program files on the disk and let you select one by a single key press.

Assemblers and Compilers

Before you can create any CP/M programs, you need either a Z80 or 8080 Assembler or a high level language compiler. The latter of course, is very much easier and for around £60, you can buy a top class compiler such as FTL Modula 2 or Turbo Pascal. As this is likely to be beyond the budget of many readers, we will stick to Assembly Language.

The assembler I have used is GEN80 by Hisoft. This is sold as a package called DEVPAC80, which also includes one of the few CP/M full screen editors and a first class front panel debugger. The assembler supports the proper Zilog Z80 op-codes and pseudo-ops and has very powerful macro capabilities. At just under £40 this package is very good value for money and I thoroughly recommend it.

If you don't have this package, but have a copy of M80 you can assemble the program using this if you convert the DEFx pseudo-ops to INTEL style DB, DS. I'm afraid if you only have the Digital Research MAC assembler you will have problems. I experimented by changing the pseudo-ops and including Z80.LIB and got about 50 errors. Rather than finding all the alternate INTEL op-codes I would suggest that you use SID to enter the HEX dump and consider buying a proper Z80 assembler.

Making a Program Auto-start

CP/M's popularity as an operating system has never had very much to do with either its facilities or user friendliness. In fact in one review of the leading Z80 based operating systems it came last in most categories. Its success lies in its ease of implementation on a wide variety of hardware. However, with CP/M+, Digital Research tackled many of its shortcomings. One new feature was a simple means of auto-starting a program. The mechanism is very simple. During a cold-start, the system disk is searched for the file PROFILE.SUB. If the file is found, an attempt is made to execute the command:

```
A >SUBMIT PROFILE
```

To make use of this we need to make up a system disk with the files:

```
CP/M+.SYS
CCP.COM
SUBMIT.COM
```

We then use an editor to create the file PROFILE.SUB, which is a text file and contains the single line:

```
MENU <cr>
```

In future when this disk is booted, SUBMIT.COM is run, it reads PROFILE.SUB and attempts to execute our program MENU.COM.

Z80 Assembley Language

To those familiar with the 6502, the Z80 instruction set may at first seem a little strange. The main differences are:

(i) most instructions have the form LD dest,source.

(ii) there is no zero page, but many registers; these can be used singly A,B,C,D,E,H,L or in pairs AF, BC, DE, HL (the index registers IX, IY have not been used).

(iii) many operations do not set the status bits and so it must be done explicitly e.g. OR A.

(iv) there are a few complex instructions e.g. LDIR, which is used for block moves and assumes that certain registers are present.

Creating a Program Menu

The intention of our program is to generate a menu of the program files on the disk, so the steps can be summarised as follows:

```
WHILE more files on disk
    - find next
    - IF extension is .COM THEN
    - display key and file name
    - ENDIF
ENDWHILE
get key pressed
execute corresponding program
```

Directory Searching

CP/M makes directory searches very easy for us by providing BDOS function calls to do precisely what we want. To use these we must know, how to call a BDOS function, how to supply file information and where to find the information returned by CP/M.

Fortunately the first two of these are quite simple. To make any BDOS call, we first set the function code in register C and the function parameter (if any) is placed in the register pair DE. Finally we call the BDOS entry point, 0005H. A good example is provided by the subroutine CHROUT at the start of the listing, which is used to output a character to the screen.

For file related functions, it is clearly not possible to pass all the required information in a register pair, so instead we pass the address of a parameter block called the FCB (File Control Block). This is a standard CP/M structure of which we will use only a small portion for the filename and filetype.

```
FCB: 1 byte   - not used
     8 bytes  - filetype
     3 bytes  - filetype
     21 bytes - not used
```

As we wish to find any COM file, we initialise filename to the string "????????" and filetype to "COM". We are now ready to use the BDOS functions 17 and 18 to find respectively the first and subsequent files matching this specification.

The response from CP/M is a single byte value in the A register, which the manual tells us is either OFFH (no file) or an offset multiplier. The offset multiplier tells us whereabouts in the DMA (Direct Memory Access) area we will find the file data. The formula used is:
080H (DMA default addr) + 32 * A

Menu Display & Program Execution

Having found the program files, it is very simple to display the menu using the standard BDOS calls for character and string output and finally wait for a user input using CONIN. The one problem remaining is to activate the selected program. This is done once again by a BDOS call, which initially requires the filename of selected file to be placed at the start of the DMA area.

As you can see from the completed program, most of the I/O operations have been made very simple by CP/M and the majority of the code is involved simply with calculating offsets to data and moving data from one area to another.

To date, most discussion of the C128's CP/M Mode has concentrated on the range of business packages that are available. Little has been said, however, about writing your own programs in this mode. While the limited screen display facilities mean you are certainly not going to write the next mega-hit arcade game in this mode, there remain several good reasons for widening your programming horizons. Consider the following:

- faster and simpler disk file operations,
- very wide choice of professional program development packages,
- finished programs can be used on a wide variety of computer systems,
- large base of Public Domain software, providing many useful routines.

In this review we are going to look at just some of the assemblers and compilers available for the C128 in CP/M mode. At present there are few UK retailers stocking these, but the two companies mentioned at the end of the article specialise in supply of CP/M and MS-DOS software at competitive prices. When ordering for the C128 you should state either the disk drive (not 1541) or the MFM format e.g. KAYPRO II.

Assemblers

Even if you intend to program mainly in a high level language, an assembler is always useful for those odd little routines. There are three main contenders in this market and the choice will depend on the intended usage.

If you get the Commodore CP/M utilities pack, this contains the Digital Research MAC and RMAC assemblers. These are Intel 8080 Assemblers and can be used to write Z80 programs using the Z80 macro library on the CP/M sources disk. This is alright for short subroutines, but not really suitable for writing large assembly language programs.

The most widely used CP/M Assembler is M80 by Microsoft. This has the advantage that you can choose whether to use Z80 or 8080 mnemonics, which can be useful when you want to make use of library routines. This is a very comprehensive package including a linker, librarian and cross-reference utility. On the negative side it uses mainly Intel Pseudo-ops and at around £80 is still rather expensive.

At about half this price, Hisoft's DEVPAC80 is a true Z80 Macro Assembler package. This is the grown

up version of their very popular Spectrum assembler package and has the big bonus of a first class full-screen editor. This supports Wordstar commands as default, but you can redefine them how you like. The second program is GEN80 the assembler, which has a powerful MACRO facility and produces COM files directly. If you have run-time problems then you load up MON80 a powerful front panel debugger which allows you to see just what's happening. A first class package at a very reasonable price.

BASIC

CP/M gives you a good opportunity to come to grips with more sophisticated programming languages, but those who wish to remain faithful to the old war horse are well catered for.

If you prefer an interpreter to a Compiler, Mallard BASIC may be worth a look. This is essentially the same BASIC as used in the Amstrad, but adapted for CP/M. For some reason Amstrad versions have more features than others, but cost about half the price and this should more or less ensure that it is little used on other machines.

A more obvious choice therefore might be M-BASIC from Microsoft, who wrote the Commodore's BASICs. Fortunately this version is much more comprehensive than BASIC 2.0, but you should have few problems adapting. This can still be rather an expensive package and looks overdue for a price cut. Watch out for package deals with M80, if you are interested in both. The main advantage is the large quantity of existing software in this dialect.

C-BASIC, Digital Researches Commercial BASIC also has large libraries of existing software. It has some useful facilities, but is generally rather lacking in features. Take care as both interpreters and full compilers are sold. A budget priced version of the compiler for the Amstrad is now available, but it is generally expensive.

A fairly recent newcomer is Z-BASIC. This is supposedly quite similar to M-BASIC, but has some nice extensions such as labelled GOTO and GOSUB, automatic indenting and variable precision for floating point arithmetic. It also provides some nice user facilities like those of Turbo Pascal, and with very fast benchmarks and a price tag of around £70, looks the pick of the bunch.

Pascal

If you are thinking of moving on from BASIC, Pascal is the logical choice and CP/M gives you the choice of some really top class products.

If you are an ICPUG member (and you really should be if you are reading Britain's only serious Commodore Magazine!) then you can get JRT Pascal for the price of an empty disk and postage. Ask for disks CL2 & CL3. I know nothing about this compiler, but you can't grumble at the price.

The compiler by which most others are now judged is Borland's Turbo Pascal. This sets new standards of performance, usability and price when it was released and the opposition has only recently started to catch up. It is often criticised for its very non-standard Pascal extensions (what is a standard extension?), but about half a million satisfied users will tell you, that this gives you a real 'do anything' high level language system. Unlike many Pascals, it also has adequate precision for most scientific work. If you have around £50, you can't go far wrong with Turbo.

A good low cost alternative is Pascal80 from Hisoft. This comfortably wins the Pascal speed stakes, but lacks accuracy in floating point operations. The latest version is packaged with ED80 and achieves much of the user friendliness of Turbo Pascal. At £40 this is a good package for the beginner.

Two other compilers should also be mentioned in this section. DR's MT Pascal is a very good compiler, with extensive CP/M libraries in existence, but low cost versions have only as yet appeared for the Amstrad. Purists of course will insist on the full ISO standard Prospero Pascal, it is just a pity that they will probably have to sell their 128 to buy it.

C

C is the high level language favoured by assembly language programmers, who are forced to use a high level language as it allows you to continue writing unintelligible programs. To be fair C is excellent for systems software. Most CP/M compilers for C fall into the category of 'very expensive'. BDSC, for example will set you back over £100 and only supports integer arithmetic. For floating point capability the choice lies between AZTEC C (approx £150) or ECO C, which is depressingly slow but a relative bargain at about £80. For systems work of course floating point is not essential and Hisoft's offering at around £40 should satisfy most needs, although the performance is not that exciting to say the least.

Modular 2

This is another language from Nicholas Wirth, the author of Pascal and is quite similar to ADA, but is much easier to compile. If you can live with a language in which FRED, fred and Fred are all different variables, it's very good and has the big advantage that it is very easy to reuse bits of your old programs. Until recently the cost of a compiler used to be a deterrent, but you can get a basic FTL Modula-2 compiler for £50.

With unusually good floating point precision and sensational benchmarks, this product seems destined to finally dislodge Turbo Pascal from the top compiler spot. One word of warning, however, while Modular-2 is a very good language to learn it cannot be recommended to those with no previous Pascal experience, as good textbooks are very expensive.

Fortran & COBOL

These very old languages cannot be recommended unless you use them already. Fortran is still useful for scientific applications and at about £40 Nevada Fortran is good value. There is a similarly named and priced COBOL compiler, but for data intensive applications DBASE II is probably a better bet.

Touchline:

Suppliers: *CP/M Software, Grey Matter, 4 Prigg Meadow, Ashburton, Devon TQ13 7DF.* ***Tel:*** *0364 53499. The Software Toolshop, The Old School, Greenfield, Bedford MK45 5DE.* ***Tel:*** *0525 718271.*

```
Pass 1 errors: 00

0100          ; CP/M standard addresses and useful definitions
0100
0005          BDOS      EQU   #0005     ; BDOS vector address
0080          DMA       EQU   #80       ; CP/M disk buffer offset
0100
0002          WRITE     EQU   2         ; CONOUT
0001          READ      EQU   1         ; CONIN
0009          PRINT     EQU   9         ; STRING OUTPUT
0011          FINDF     EQU   17        ; FIND FIRST
0012          FIND      EQU   18        ; FIND NEXT
002F          CHAIN     EQU   47        ; CHAIN PROGRAM
006E          SETTRM    EQU   110       ; SET STRING TERMINATOR
0100
0000          NULL      EQU   0         ; null character for string te
rmination
001B          ESC       EQU   27        ; ESCape code for screen funct
ions
0020          SPACE     EQU   32        ; ASCII space
001A          CTRLZ     EQU   26        ; ↑Z
0007          BELL      EQU   7         ; ↑G
003D          AEQ       EQU   61        ; =
0100
0100          ; set stack position and goto start
0100
0100 ED7B0600           LD    SP,(6)    ; below BDOS
0104 C38203             JP    MENU
0107
0107          ; basic subroutines
0107
0107          CHROUT
0107          ; Outputs character in A register to screen
0107          ; all registers preserved
0107 E5                 PUSH  HL
0108 D5                 PUSH  DE
0109 C5                 PUSH  BC
010A F5                 PUSH  AF
010B 5F                 LD    E,A       ; move character to E register
010C 0E02               LD    C,WRITE   ; function = CONOUT
010E CD0500             CALL  BDOS
0111 F1                 POP   AF
0112 C1                 POP   BC
0113 D1                 POP   DE
0114 E1                 POP   HL
0115 C9                 RET
0116
0116          CHRIN
0116          ; Waits for character input and returns it in A register
0116 E5                 PUSH  HL
0117 D5                 PUSH  DE
0118 C5                 PUSH  BC
0119 0E01               LD    C,READ    ; function = CONIN
011B CD0500             CALL  BDOS
011E C1                 POP   BC
011F D1                 POP   DE
0120 E1                 POP   HL
0121 C9                 RET
0122
0122
0122          TXTOUT
0122          ; Outputs a string in ASCIZ format (terminated by 0 byte)
0122          ; DE contains address of string, all other registers preser
ved
0122 F5                 PUSH  AF
0123 C5                 PUSH  BC
0124 E5                 PUSH  HL
0125 0E09               LD    C,PRINT
0127 CD0500             CALL  BDOS
012A E1                 POP   HL
012B C1                 POP   BC
012C F1                 POP   AF
012D C9                 RET
012E
012E          CLS
012E          ; Clear screen
012E F5                 PUSH  AF
012F 3E1A               LD    A,CTRLZ
0131 CD0701             CALL  CHROUT
0134 F1                 POP   AF
0135 C9                 RET
0136
0136          CURXY
0136          ; Set cursor to X,Y on screen (ADM31)
0136          ; B register = Y, C register = X, others preserved
0136 F5                 PUSH  AF
0137 3E1B               LD    A,ESC
0139 CD0701             CALL  CHROUT
013C 3E3D               LD    A,AEQ
013E CD0701             CALL  CHROUT
0141 78                 LD    A,B
0142 C620               ADD   A,SPACE   ; add 32 to row
0144 CD0701             CALL  CHROUT
0147 79                 LD    A,C
0148 C620               ADD   A,SPACE   ; add 32 to column
014A CD0701             CALL  CHROUT
014D F1                 POP   AF
014E C9                 RET
014F
014F          ; screen colour routines for C=128 only !
014F          ; FCOL sets foreground colour, BCOL sets background colour
014F          ; A register contains 80 column colour code
014F
014F 1B1B1B00 CLEAD     DEFB  ESC,ESC,ESC,NULL; lead-in chars for colour
change
0153
0153 C61F     FCOL      ADD   A,#1F
0155 1802               JR    CHGCOL
0157 C62F     BCOL      ADD   A,#2F
0159 D5       CHGCOL    PUSH  DE
015A 114F01             LD    DE,CLEAD
015D CD2201             CALL  TXTOUT
0160 D1                 POP   DE
0161 CD0701             CALL  CHROUT
0164 C9                 RET
0165
0165          COMFIL
0165          ; Find first or next .COM file
0165          ; C = function first or next
0165          ; A returns completion code
0165          ; other registers preserved
0165 E5                 PUSH  HL
0166 D5                 PUSH  DE
0167 C5                 PUSH  BC
0168 112502             LD    DE,FCBCOM
016B CD0500             CALL  BDOS
016E C1                 POP   BC
016F D1                 POP   DE
0170 E1                 POP   HL
0171 C9                 RET
0172
0172          RNAME
0172          ; Read name of file found from DMA to DIRTAB
0172          ; A = return code from FINDF/FIND
0172          ; On exit HL points to DIRTAB entry
0172 C5                 PUSH  BC
0173 D5                 PUSH  DE
0174 CB27               SLA   A
0176 CB27               SLA   A
0178 CB27               SLA   A
017A CB27               SLA   A
017C CB27               SLA   A         ; A*32
017E 218000             LD    HL,DMA
0'81 85                 ADD   A,L
0182 6F                 LD    L,A
0183 23                 INC   HL
0184 114602             LD    DE,DIRTAB
0187 3ACF02             LD    A,(COUNT)
018A CB27               SLA   A
018C CB27               SLA   A
018E CB27               SLA   A         ; A*8
0190 83                 ADD   A,E
0191 5F                 LD    E,A
0192 3E00               LD    A,0
0194 8A                 ADC   A,D       ; may be a carry
0195 57                 LD    D,A
0196 D5                 PUSH  DE        ; save entry address
0197 010800             LD    BC,8
U19A EDB0               LDIR            ; copy name to DIRTAB
019C E1                 POP   HL        ; entry address in HL
019D D1                 POP   DE
019E C1                 POP   BC
019F C9                 RET
01A0
01A0          CMPSTR
01A0          ; Compare string pointed to by HL with string pointed to by
DE
01A0          ; B = no of characters to compare, all regs destroyed.
01A0          ; Set carry if strings equal.
01A0 1A       CMPLP     LD    A,(DE)
01A1 BE                 CP    (HL)
01A2 2006               JR    NZ,CMPEX
01A4 13                 INC   DE
01A5 23                 INC   HL
01A6 10F8               DJNZ  CMPLP
01A8 37                 SCF             ; strings the same, set carry
flag
01A9 C9                 RET
01AA B7       CMPEX     OR    A         ; clear carry
01AB C9                 RET
01AC
01AC          CHKCCP
01AC          ; Check if file is CCP.COM
01AC          ; HL points to DIRTAB entry
01AC C5                 PUSH  BC
01AD D5                 PUSH  DE
01AE E5                 PUSH  HL
01AF 11D002             LD    DE,CCPSTR
01B2 0608               LD    B,8
01B4 CDA001             CALL  CMPSTR
01B7 E1                 POP   HL
01B8 D1                 POP   DE
01B9 C1                 POP   BC
01BA C9                 RET
01BB
01BB          CHKMEN
01BB          ; Check if file is MENU.COM
01BB          ; HL points to DIRTAB entry
01BB C5                 PUSH  BC
01BC D5                 PUSH  DE
01BD E5                 PUSH  HL
01BE B7                 OR    A         ; clear carry flag
01BF 11D802             LD    DE,MENSTR
01C2 0608               LD    B,8
01C4 CDA001             CALL  CMPSTR
01C7 E1                 POP   HL
01C8 D1                 POP   DE
01C9 C1                 POP   BC
01CA C9                 RET
01CB
01CB          CHKSUB
01CB          ; Check if file is SUBMIT.COM
01CB          ; HL points to DIRTAB entry
01CB C5                 PUSH  BC
01CC D5                 PUSH  DE
01CD E5                 PUSH  HL
01CE B7                 OR    A         ; clear carry flag
01CF 11E002             LD    DE,SUBSTR
01D2 0608               LD    B,8
01D4 CDA001             CALL  CMPSTR
01D7 E1                 POP   HL
01D8 D1                 POP   DE
01D9 C1                 POP   BC
01DA C9                 RET
01DB
01DB
01DB          PRTFIL
01DB          ; Print out name of file
01DB          ; HL points to DIRTAB entry , BC & DE preserved
01DB C5                 PUSH  BC
01DC D5                 PUSH  DE
01DD 11C602             LD    DE,NAMBUF
01E0 D5                 PUSH  DE
01E1 010800             LD    BC,8
```

```
01E4 EDB0        227              LDIR                 ; copy name to NAMBUF
01E6 D1          228              POP   DE
01E7 CD2201      229              CALL  TXTOUT
01EA D1          230              POP   DE
01EB C1          231              POP   BC
01EC C9          232              RET
01ED             233 ; Program data areas
01ED 43502F4D    234 TITLE        DEFM  'CP/M plus SYSTEM DISK AUTO MENU'
020C 00          235              DEFB  NULL
020D 28432920    236 CNOTE        DEFM  '(C) Paul Schofield 1987'
0224 00          237              DEFB  NULL
0225             238 FCBCOM                            ; any .COM file
0225 00          239              DEFB  NULL
0226 3F3F3F3F    240              DEFM  '????????COM'
0231             241              DEFS  21
0246             242 DIRTAB                            ; list of .COM files found
0246             243              DEFS  128
02C6             244 NAMBUF       DEFS  8
02CE 00          245              DEFB  NULL
02CF FF          246 COUNT        DEFB  #FF            ; file count
02D0 43435020    247 CCPSTR       DEFM  'CCP     '
02D8 4D454E55    248 MENSTR       DEFM  'MENU    '
02E0 5355424D    249 SUBSTR       DEFM  'SUBMIT  '
02E8 4E6F202E    250 NOCOM        DEFM  'No .COM files on this disk. Press any key
to contiue.
031F 00          251              DEFB  NULL
0320 53656C65    252 SELMES       DEFM  'Select program by entering the correspond
ing number,'
0354 00          253              DEFB  NULL
0355 6F722070    254 NOSEL        DEFM  'or press any other key to return to CP/M.

0381 00          255              DEFB  NULL
0382             256
0382             257 MENU
0382             258 ; Start of main program
0382 0E6E        259              LD    C,SETTRM     ; change string terminator for
0384 1E00        260              LD    E,0          ; ASCIZ format
0386 CD0500      261              CALL  BDOS
0389 3E10        262              LD    A,16
038B CD5701      263              CALL  BCOL         ; lt gray background
038E 3E07        264              LD    A,7
0390 CD5301      265              CALL  FCOL         ; blue characters
0393 CD2E01      266              CALL  CLS          ; clear screen
0396 0601        267              LD    B,1
0398 0E18        268              LD    C,24         ; row 1, col 24
039A CD3601      269              CALL  CURXY
039D 11ED01      270              LD    DE,TITLE     ; display title
03A0 CD2201      271              CALL  TXTOUT
03A3 0602        272              LD    B,2
03A5 0E1C        273              LD    C,28
03A7 CD3601      274              CALL  CURXY
03AA 110D02      275              LD    DE,CNOTE
03AD CD2201      276              CALL  TXTOUT
03B0 0E11        277              LD    C,FINDF
03B2 180E        278              JR    SEARCH
03B4 0E12        279 NEXTF        LD    C,FIND
03B6 3ACF02      280              LD    A,(COUNT)
03B9 FE00        281              CP    0
03BB 2005        282              JR    NZ,SEARCH
03BD 3EFF        283              LD    A,#FF
03BF 32CF02      284              LD    (COUNT),A    ; no valid file found yet
03C2 CD6501      285 SEARCH       CALL  COMFIL       ; find first next .COM file
03C5 FEFF        286              CP    #FF
03C7 CA1804      287              JP    Z,ALL        ; all .COM files found ?
03CA F5          288              PUSH  AF
03CB 3ACF02      289              LD    A,(COUNT)
03CE FEFF        290              CP    #FF
03D0 2005        291              JR    NZ,NOTF      ; IF first file
03D2 3E00        292              LD    A,0          ; THEN init COUNT
03D4 32CF02      293              LD    (COUNT),A
03D7 F1          294 NOTF         POP   AF
03D8 CD7201      295              CALL  RNAME        ; read name from DMA
03DB CDAC01      296              CALL  CHKCCP       ; CCP.COM ??
03DE 38D4        297              JR    C,NEXTF
03E0 CDBB01      298              CALL  CHKMEN       ; MENU.COM
03E3 38CF        299              JR    C,NEXTF
03E5 CDCB01      300              CALL  CHKSUB
03E8 38CA        301              JR    C,NEXTF
03EA 3ACF02      302              LD    A,(COUNT)
03ED C605        303              ADD   A,5
03EF 47          304              LD    B,A
03F0 0E18        305              LD    C,24
03F2 CD3601      306              CALL  CURXY
03F5 3ACF02      307              LD    A,(COUNT)
03F8 C630        308              ADD   A,48
03FA CD0701      309              CALL  CHROUT
03FD 3E2E        310              LD    A,'.'
03FF CD0701      311              CALL  CHROUT
0402 3E20        312              LD    A,SPACE
0404 CD0701      313              CALL  CHROUT
0407 CDDB01      314              CALL  PRTFIL       ; printout filename
040A 3ACF02      315              LD    A,(COUNT)
040D FE09        316              CP    9
040F 2807        317              JR    Z,ALL
0411 3C          318              INC   A
0412 32CF02      319              LD    (COUNT),A
0415 C3B403      320              JP    NEXTF
0418 3ACF02      321 ALL          LD    A,(COUNT)
041B FEFF        322              CP    #FF
041D 2019        323              JR    NZ,SELECT    ; Any .COM files found
041F 0605        324              LD    B,5
0421 0E01        325              LD    C,1
0423 CD3601      326              CALL  CURXY
0426 11E802      327              LD    DE,NOCOM
0429 CD2201      328              CALL  TXTOUT
042C 3E07        329              LD    A,BELL
042E CD0701      330              CALL  CHROUT
0431 CD1601      331              CALL  CHRIN
0434 CD2E01      332 NONE         CALL  CLS
0437 C7          333              RST   0            ; EXIT to CP/M
0438 3ACF02      334 SELECT       LD    A,(COUNT)
043B C608        335              ADD   A,8
043D 47          336              LD    B,A
043E 0E0A        337              LD    C,10
0440 CD3601      338              CALL  CURXY
0443 112003      339              LD    DE,SELMES
0446 CD2201      340              CALL  TXTOUT
0449 04          341              INC   B
044A CD3601      342              CALL  CURXY
044D 115503      343              LD    DE,NOSEL
0450 CD2201      344              CALL  TXTOUT
0453 3E07        345              LD    A,BELL
0455 CD0701      346              CALL  CHROUT
0458 CD1601      347              CALL  CHRIN
045B CD2E01      348              CALL  CLS
045E FE30        349              CP    48
0460 FA3404      350              JP    M,NONE
0463 47          351              LD    B,A
0464 3ACF02      352              LD    A,(COUNT)
0467 C630        353              ADD   A,48
0469 B8          354              CP    B
046A FA3404      355              JP    M,NONE
046D 214602      356              LD    HL,DIRTAB
0470 78          357              LD    A,B
0471 D630        358              SUB   48
0473 CB27        359              SLA   A
0475 CB27        360              SLA   A
0477 CB27        361              SLA   A            ; A*8
0479 85          362              ADD   A,L
047A 6F          363              LD    L,A
047B 3E00        364              LD    A,0
047D 8C          365              ADC   A,H          ; may be a carry
047E 67          366              LD    H,A
047F 118000      367              LD    DE,DMA
0482 010800      368              LD    BC,8
0485 EDB0        369              LDIR               ; copy filename to DMA
0487 3E20        370              LD    A,SPACE
0489 12          371              LD    (DE),A       ; may be 8 char filename
048A 218000      372              LD    HL,DMA
048D BE          373 FEND         CP    (HL)
048E 2803        374              JR    Z,RUNP
0490 23          375              INC   HL
0491 18FA        376              JR    FEND
0493 3600        377 RUNP         LD    (HL),NULL    ; command terminator
0495 0E2F        378              LD    C,CHAIN
0497 1EFF        379              LD    E,#FF        ; chain flag
0499 CD0500      380              CALL  BDOS         ; should be no return
049C C7          381              RST   0            ; just in case
Pass 2 errors: 00

Symbol Table used: #0296 out of #4500.
```

```
CP/M 3 DUMP - Version 3.0
0000: ED 7B 06 00 C3 82 03 E5 D5 C5 F5 5F 0E 02 CD 05  .+.........+....
0010: 00 F1 C1 D1 E1 C9 E5 D5 C5 0E 01 CD 05 00 C1 D1  ................
0020: E1 C9 F5 C5 E5 0E 09 CD 05 00 E1 C1 F1 C9 F5 3E  ...............>
0030: 1A CD 07 01 F1 C9 F5 3E 1B CD 07 01 3E 3D CD 07  .......>....>=..
0040: 01 78 C6 20 CD 07 01 79 C6 20 CD 07 01 F1 C9 1B  .x. ...y. ......
0050: 1B 1B 00 C6 1F 18 02 C6 2F D5 11 4F 01 CD 22 01  ......../..O..'.
0060: D1 CD 07 01 C9 E5 D5 C5 11 25 02 CD 05 00 C1 D1  ..........%.....
0070: E1 C9 C5 D5 CB 27 CB 27 CB 27 CB 27 CB 27 21 80  .....'.'.'.'.'!.
0080: 00 85 6F 23 11 46 02 3A CF 02 CB 27 CB 27 CB 27  ..o#.F.:...'.'.'
0090: 83 5F 3E 00 8A 57 D5 01 08 00 ED B0 E1 D1 C1 C9  .+>..W..........
00A0: 1A BE 20 06 13 23 10 F8 37 C9 B7 C9 C5 D5 E5 11  .. ..#..7.......
00B0: D0 02 06 08 CD A0 01 E1 D1 C1 C9 C5 D5 E5 B7 11  ................
00C0: D8 02 06 08 CD A0 01 E1 D1 C1 C9 C5 D5 E5 B7 11  ................
00D0: E0 02 06 08 CD A0 01 E1 D1 C1 C9 C5 D5 11 C6 02  ................
00E0: D5 01 08 00 ED B0 D1 CD 22 01 D1 C1 C9 43 50 2F  .........'....CP/
00F0: 4D 20 70 6C 75 73 20 53 59 53 54 45 4D 20 44 49  M plus SYSTEM DI
0100: 53 4B 20 41 55 54 4F 20 4D 45 4E 55 00 28 43 29  SK AUTO MENU.(C)
0110: 20 50 61 75 6C 20 53 63 68 6F 66 69 65 6C 64 20   Paul Schofield
0120: 31 39 38 37 00 00 3F 3F 3F 3F 3F 3F 3F 3F 43 4F  1987..????????CO
0130: 4D 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  M...............
0140: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0150: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0160: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0170: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0180: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0190: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
01A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
01B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
01C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 FF  ................
01D0: 43 43 50 20 20 20 20 20 4D 45 4E 55 20 20 20 20  CCP     MENU
01E0: 53 55 42 4D 49 54 20 20 4E 6F 20 2E 43 4F 4D 20  SUBMIT  No .COM
01F0: 66 69 6C 65 73 20 6F 6E 20 74 68 69 73 20 64 69  files on this di
0200: 73 6B 2E 20 50 72 65 73 73 20 61 6E 79 20 6B 65  sk. Press any ke
0210: 79 20 74 6F 20 63 6F 6E 74 69 6E 75 65 2E 20 00  y to continue. .
0220: 53 65 6C 65 63 74 20 70 72 6F 67 72 61 6D 20 62  Select program b
0230: 79 20 65 6E 74 65 72 69 6E 67 20 74 68 65 20 63  y entering the c
0240: 6F 72 72 65 73 70 6F 6E 64 69 6E 67 20 6E 75 6D  orresponding num
0250: 62 65 72 2C 00 6F 72 20 70 72 65 73 73 20 61 6E  ber,.or press an
0260: 79 20 6F 74 68 65 72 20 6B 65 79 20 74 6F 20 72  y other key to r
0270: 65 74 75 72 6E 20 74 6F 20 43 50 2F 4D 2E 20 20  eturn to CP/M.
0280: 20 00 0E 6E 1E 00 CD 05 00 3E 10 CD 57 01 3E 07   ..n.....>..W.>.
0290: CD 53 01 CD 2E 01 06 01 0E 18 CD 36 01 11 ED 01  .S.........6....
02A0: CD 22 01 06 02 0E 1C CD 36 01 11 0D 02 CD 22 01  .'......6.....'.
02B0: 0E 11 18 0E 0E 12 3A CF 02 FE 00 20 05 3E FF 32  ......:.... .>.2
02C0: CF 02 CD 65 01 FE FF CA 18 04 F5 3A CF 02 FE FF  ...e.......:....
02D0: 20 05 3E 00 32 CF 02 F1 CD 72 01 CD AC 01 38 D4   .>.2....r....8.
02E0: CD BB 01 38 CF CD CB 01 38 CA 3A CF 02 C6 05 47  ...8....8.:....G
02F0: 0E 18 CD 36 01 3A CF 02 C6 30 CD 07 01 3E 2E CD  ...6.:...0...>..
0300: 07 01 3E 20 CD 07 01 CD DB 01 3A CF 02 FE 09 28  ..> ......:....(
0310: 07 3C 32 CF 02 C3 B4 03 3A CF 02 FE FF 20 19 06  .<2.....:.... ..
0320: 05 0E 01 CD 36 01 11 E8 02 CD 22 01 3E 07 CD 07  ....6.....'.>...
0330: 01 CD 16 01 CD 2E 01 C7 3A CF 02 C6 08 47 0E 0A  ........:....G..
0340: CD 36 01 11 20 03 CD 22 01 04 CD 36 01 11 55 03  .6.. ..'...6..U.
0350: CD 22 01 3E 07 CD 07 01 CD 16 01 CD 2E 01 FE 30  .'.>...........0
0360: FA 34 04 47 3A CF 02 C6 30 B8 FA 34 04 21 46 02  .4.G:...0..4.!F.
0370: 78 D6 30 CB 27 CB 27 CB 27 85 6F 3E 00 8C 67 11  x.0.'.'.'.o>..g.
0380: 80 00 01 08 00 ED B0 3E 20 12 21 80 00 BE 28 03  .......> .!...(.
0390: 23 18 FA 36 00 0E 2F 1E FF CD 05 00 C7 FF FF FF  #..6../.........
03A0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF  ................
03B0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF  .. .............
03C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
03D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
03E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
```

Making Music

Continuing our music series, this month we look at ring modulation, synchronisation and filtering.

By Peter Gerrard

We've mentioned ring modulation briefly; the art of modulating one voice with respect to another, so that a totally different kind of sound is produced. Rather than having one voice trying to impersonate another, two (or three) voices are combined here to produce something that sounds at times, nothing like any of the original voices.

This is because the frequency and volume of one voice is constantly varying with respect to another, and it is one of the ways available to us in which the overall volume control, which must be set to the same value for all three voices, can be somewhat overridden to give the effect of voices playing at different volumes.

One simple way of doing this is to play different waveforms at different octave levels for different voices, but ring modulation gives us a further, and more accurate, way of doing this.

Apart from altering volumes, it also allows us to produce some very interesting sound effects. On the debit side, we have to use at least two voices (you can't modulate a voice with nothing) and so we are now effectively limited to a two voice synthesiser. However, the effects produced are well worth this apparently minor limitation, and by judicious use of various settings we can still have three very different sounds being produced by the three voices.

The important thing to remember is that what we are altering, when modulating one voice with respect to another, is the frequency and volume of the note being played. In other words, what would have been a constant frequency played at a constant volume is now a variable frequency at a variable volume – very useful.

Some Rules
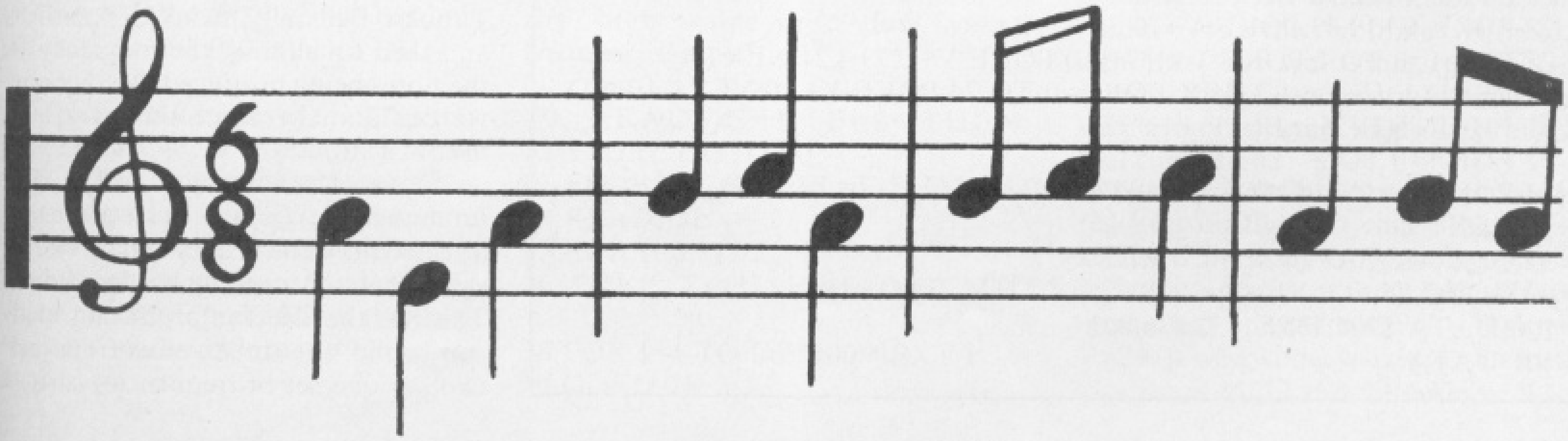
We cannot, of course, use ring modulation as and when we feel like it. Disregarding the totally unmusical effects that might be produced as a result of doing this, the Commodore 64 is not set up to be a true synthesiser, and try as we might, we cannot persuade it to do things that it wasn't designed for.

Chief among the rules that must be obeyed is that if we want to modulate voice one with respect to voice three, voice one must be playing with a triangle waveform. Voice three can be using whatever waveform you feel like, white noise if you want, but voice one must be using that triangle waveform.

Similarly, modulating voice three with respect to voice two means that voice three must now have the triangle waveform. Of course, there is nothing to stop us setting all three voices to triangle waveforms and modulating the whole lot with respect to each other. This can be rather interesting.

Bits of information

In order to achieve this modulation we must look to control registers 54276, 54283 and 54290, or using our base of V=54272, then we are altering the content of registers V+4, V+11 and V+19. These, as you are probably only too well aware, are the registers used to



control the waveforms of the various voices, so let's take a look at just one of those registers, namely V+4.

128 064 032 016 008 004 002 001
007 006 005 004 003 002 001 000
001 001 001 001 000 002 003 001

This is a multi-purpose register, and we can fiddle with every bit of bit *except* bit three, which seems to have no purpose in life, poor thing.

Bits seven, six, five, four and zero are used purely for the waveform. That is, POKEing V+4 with either 128+1, 64+1, 32+1 or 17+1 selects our white noise, pulse, sawtooth or triangle waveforms. POKEing V+4 with either 128, 64, 32 or 16 turns the waveform off again, although a zero would do the job just as well.

Bit two is the one that interests us here, since this is the one that affects the ring modulation. Setting this bit to one turns ring modulation on, while setting it to zero turns ring modulation off again. Thus the effect can be either on or off, no half measures here I'm afraid.

So, if we had selected the sawtooth waveform for voice three and a triangle one for voice one, and we wanted to modulate voice one with respect to voice three we could either POKE V+4,21 or, to be on the safe side, POKE V+4,PEEK(V+4) or 4. In this later option whatever was set would remain set, and bit two would now be turned on as well. By playing a note we could now see the effects of ring modulation on voices one and three.

It works in the same way for any of the other voices, so that attempting to modulate voice two with respect to voice three would require us to POKE V+11,PEEK(V+11) OR 4, and so on. Setting everything to a triangle waveform and modulating all voices with respect to each other is the ultimate in ring modulation, and in the following example we'll see just what sort of thing can be achieved. Let's go back to our Close Encounters theme. (See foot of page).

Almost the same as before, but this time we're using the ring modulation effect and setting all the voices to be triangular waveforms. This is achieved by POKEing a 21 into all the waveform registers in line 25. As before, line 35 halts proceedings until the space bar is pressed, whereupon the program hops off back to line 25 to get another note. With just this minor change, you can see how dramatically different the effect can be.

You might now care to amend some of the earlier programs to incorporate this effect, so that (for example) we could be playing notes in different octaves and having everything modulated with respect to everything else, or we could be playing chords, so that the three different notes in the chord are again all being modulated with each other. The difference in sound is really quite suprising.

At the moment, we can only really use this ring modulation as a novelty item, and we can't in all honesty, produce anything startingly useful.

Synchronisation is another great weapon at our disposal, and by combining the two effects we can begin to make great progress.

Synchronisation

The basis behind all true synthesisers, and also the basis for the works produced by 'electronic' composers such as Jean Michael-Jarre, or groups like Tangerine Dream, is synchronisation. That is, you set up one voice to play a straightforward musical tune, like the 'riff' to be found in Tubular Bells, for example (which we'll be looking at in a moment), and then synchronise the voice playing that riff with another voice. Then, while the one voice merrily carries on playing its little tune to itself over and over again the composer or group can simply play with the other voice, in the confident knowledge that the 'riff' voice will attempt to follow it, or synchronise with it.

To put it another way, voice three might be playing its tune in the key of C, while voice one is being made to play notes, C, F, C, G, F and back to C again. This is the simple 12 bar boogie stuff that has made vast fortunes for a number of different groups over the years. The tune in C then tries to follow this sequence of C, F, C, G, F and back to C again, the results being anything from wonderfully musical to truly cacophonous. The skill of the musician is to increase the level of wonderful and decrease the level of cacophony. Our task is to make the thing happen in the first place, and worry about the noise afterwards.

Combining synchronisation with ring modulation can produce some quite surprising results, but we'll leave that one for now and concentrate solely on synchronisation. As with ring modulation, we'll take a look at the rules of the game first.

Some Rules

There aren't any – thank goodness! What this feature tries to do is match the fundamental frequency of the note being played by one voice with the fundamental frequency of a note being played by another. Thus, if we were to synchronise voices one and three, voice three could be playing our Tubular Bells riff mentioned earlier, and then by altering the frequency of the notes being produced by voice one we could make voice three try and follow it around.

Note that it is only the fundamental frequencies that are affected here; the rest try and carry one as if absolutely nothing has happened. This has the effect of producing what can sound like three voices from just two, as one set of frequencies carries

```
5 FOR I=0 TO 24:POKE 54272+I,0:NEXT
10 V=54272
15 POKE V+24,15
20 POKE V+5,9:POKE V+6,240
21 POKE V+12,9:POKE V+13,240
22 POKE V+19,33:POKE V+20,36
25 FOR I=0 TO 2:POKE V+I*7+4,0:POKE V+I*7+4,21:NEXT I
30 READ F:IF F=-1 THEN FOR I=0 TO 24:POKE V+I,0:NEXT I:END
31 FH=INT(F/256):FL=F-FH*256
32 FOR I=0 TO 2
33 POKE V+I*7,FL:POKE V+I*7+1,FH
34 NEXT I
35 GET A$:IFA$ <> " "THEN35
40 GOTO 25
100 DATA 1204,1351,1432,536,803
101 DATA -1
```

on as before, the fundamental one tries to follow the other voice, while that other voice is also playing a tune, or series of notes, all of its own.

Since it is these fundemantal frequencies that are being matched, the only rule that we must obey is the frequencies of the notes being played by voice three (assuming synchronisation is between voices one and three) must be lower, or equal to, those being played by voice one, otherwise not very much happens. You can try using higher frequencies if you like, and indeed you are encouraged to do so since, as we've seen, the only way of getting the best out of the SID chip is to mess about with the control registers and see what happens. However, theory must as usual come before practice, so let's take a look at the registers being affected by synchronisation

Bits of Information

We saw with ring modulation that the registers in question were those used to determine the waveform of the three voices, and that those registers were multi-purpose ones. Hazard a wild guess as to what the third function of those registers is? Yes, hard to believe isn't it, as well as controlling waveform and ring modulation they also look after synchronisation.

This actually makes quite a bit of sense from the point of view of the designers of the chip, since synchronisation, like ring modulation, can either be on or off, and only one bit is required to do that. There are only four waveforms that can be selected, so four bits are needed, and those waveforms can be either on or off, requiring one further bit. Consequently, there is even a spare bit left over to do nothing; redundancy, and a criminal waste. Let's look at the chip to see precisely what it is that we're going to be altering.

```
128 064 032 016 008 004 002 001
007 006 005 004 003 002 001 000
001 001 011 001 000 002 003 001
```

The bit to keep an eye out for this time is bit one, labelled three in the bottom line of information, since it is the third part of this register that we're going to be looking at. Rather like ring modulation, synchronisation can be either on or off, and each of the three registers works in exactly the same way.

To turn it on, we need to alter bit one by (assuming our base of V=54272 and altering just the only voice) POKE V+4,PEEK(V+4) OR 2. Therefore only this first bit is altered, leaving everything else as it was before we came along. Since, for the purpose of our example program we want to synchronise voice one with respect to voice three, this will be fine. Voice three can carry on in its own sweet way, with no great interference from us. Let us first of all set up the start of the program in our usual way.

```
5 FOR I=0 TO 24:POKE 54272+I,
0:NEXT
10 V=54272
15 POKE V+24,15
20 POKE V+5,9:POKE V+6,240
21 POKE V+12,9:POKE V+13,240
22 POKE V+19,33:POKE V+20,36
25 FOR I=0 TO 2:POKE V+I*7+4,0:
POKE V+I*7+4 (2 ↑ I*16+3):NEXT I
```

This sets up our three voices to have different waveforms, and to be synchronised with each other. This, of course, is impossible, as Escher musicals involves everything playing at a lower note than everything else which just cannot be achieved, but at least it will make a suitable noise and you'll be able to listen to the results!

Now we need the data for the Tubular Bells riff, and as any fans of Mike Oldfield will know the notes we need are D, E, C, D, F, G, E, F, E before going back to the start again. Fortunately for us the delays between the notes being played are quite straightforward, consisting of a standard delay of whatever length we choose and a half of that delay.

So, our data statement becomes:

```
100 DATA 2463,10,2195,10,2463,10,
2930,10
101 DATA 3288,10,2765,10,2930,10,
2765,10,0,0
```

The next line of our program can now be used to read this in and set up the high value and low value frequencies.

```
30 READ F:IF F=0 THEN
RESTORE:GOTO 30
32 FH=INT(F/256):FL=F-FH*256
34 READ DE
35 FOR I=0 TO 2
36 POKE V+I*7+1,FH:POKE V+I
*7+0,FL
38 FOR I=1 TO DE*100:NEXT I
40 GOTO 25
```

I think you'll agree, that this produces quite an unusual effect.

You might now care to try your hand at introducing chords, or notes being played at different octaves, and see what the results of that might be. We cannot yet get onto true synchronisation, because we would need an inner knowledge of how musical interrupts work and how we can combine those interrupts with a synthesiser program.

And before we can do that, we also need to know something about the workings of the last major feature of the SID chip, namely the filtering techniques. If you think ring modulation and synchronisation were using multi-purpose registers, well, in the words of someone relatively famous, *You Ain't Seen Nothing' Yet!*

Filtering

A much misunderstood and, as a consequence, must underused aspect of the Commodore 64's music capabilities is the idea of filtering. People who have managed to master this aspect of things have produced some wonderful sound programs over the years, whether as simple effects for games or background soundtracks of seemingly limitless duration and soaring originality, and you can guarantee that every successful music package sold for the Commodore 64 has had, at its heart, a deep working knowledge of filtering and how it works.

On the Commodore 64 we have four different types of filtering available to us. All work on the same principle, but adapt that principle for different needs, depending on the type of filtering selected. One can independently filter any or all of the three voices, but once filtering has been selected than any voices which are being filtered are all subject to the same type of filtering, and the same effects of selecting that type are also common to all the voices. This is similar to the volume control, although as with that particular option, things can be programmed in such a way as to seemingly get around that limitation.

As with a number of other control registers on the SID chip, filtering is achieved by using two-multi-purpose registers, and one of these is the aforementioned volume control – register V+24, if we assume, as usual, our base location is 54272 and the variable V to

be set equal to that value. Therefore we must do away with our long held belief of simply POKEing V+24,15 to turn the volume on to maximum, and POKEin V+24,0 to turn it off altogether. As we shall see, POKEing that particular register affects far more than just the volume.

But first, let's look at the four different types of filtering.

High Pass Filter

As with all the other types, this particular effect depends on a selected frequency, which is known as the cutoff frequency. We shall see how that is selected in a moment. Having determined the cutoff frequency, then, selecting a high pass filter ensures that the level of frequencies below the cutoff point are drastically reduced, while all those equal to it or higher than it are passed through as normal.

Therefore a note of frequency 1000 cycles per second, or hertz, coupled with a high pass filter and a cutoff frequency of 1100 hertz, would sound rather quiet! All frequencies below 1100 hertz would be reduced, and thus the note itself would be reduced into relative silence. Selecting a cutoff of about 900 hertz would, on the other hand, produce something. No note consists of just a simple frequency, since all the waveforms (triangle, sawtooth, pulse and noise) produce a variety of harmonics around the desired frequency. Selecting a filter and a cutoff frequency can therefore be used to amplify or reduce frequencies around a certain point, and helps to simulate more accurately a variety of musical instruments.

A high pass filter lets everything through higher than or equal to the cutoff frequency, while reducing everything lower than it.

Low Pass Filter

This, as you might expect, is the exact opposite of the high pass filter, although it operates on the same principle and still requires a cutoff frequency to be set. This time, everything lower than the cutoff frequency is passed through as normal, while everything higher than it is severely reduced. For example, a note of frequency 1000 hertz when played through a low pass filter using a cutoff frequency of around 1100 hertz would sound perfectly normal (well, almost) while changing the cutoff frequency to about 900 hertz would severely limit the sound.

A low pass filter, lets through everything lower than or equal to the cutoff frequency, while reducing everything higher than it.

Band Pass Filter

This would be something that would be useful on a televison, allowing only certain groups to be played and getting rid of anything extreme! On the Commodore 64, however, a band pass filter allows only a narrow band of frequencies to be played around the cutoff frequency, while rejecting everything below or above that band. Therefore a note of 1000 hertz played through a band pass filter with a cutoff frequency of 1000 hertz would sound less 'full' than normal since all the usual harmonics have been severely reduced, leaving just a narrow band of frequencies to get through.

In other words, a band pass filter lets through everything in a band of frequencies around the cutoff frequency, and reduces everything either higher or lower than the band.

Notch Reject Filter

The complete opposite of a band pass filter, and strictly speaking one that doesn't exist on the Commodore 64. However, by combining the already mentioned high pass and low pass filters we can produce this fourth extra filter. This time, if we select a notch reject filter and our usual cutoff frequency, everything within a narrow band centering around the cutoff frequency is rejected, while everything outside it passed through as normal. This has the effect of cutting down on the main 'sound' of a note while only playing the 'extreme' of the frequencies.

To conclude, a notch reject filter reduces everything in a narrow band, or notch, around the cutoff frequency, while letting through everything outside that notch. How does one select these various filters?

Voice and Filter Selection

Let us first of all consider the different types of filter, and the best way to do this is by looking at the register V+24.

128	064	032	016	008	004	002	001
007	006	005	004	003	002	001	000
5	4	3	2	1	1	1	1

Bits zero to three of this register are used to control the volume, and can be seen to have the values 0 to 15. Bit four is used to select a low pass filter, so POKE V+24,PEEK(V+24) OR 16 turns on a low pass filter while keeping the volume at its normal level. Or, if you like, POKE V+24,31 sets a low pass filter with a maximum volume.

Bit five is used to select a band pass filter, so that POKE V+24,47 can be used to select that filter while keeping the volume at maximum level.

Bit six is used to select a high pass filter, so that POKE V+24,79 can be chosen to switch a high pass filter on, switch all the others off, and again keep the volume at maximum level.

Bit seven is used to turn all the filters off, so POKE V+24,143 does precisely that, but once more keeps the volume at maximum.

Finally our 'hybrid' filter is chosen by combining a high pass with a low pass filter for the notch reject filter, so to set that we must POKE V+24,(64+16+15) or POKE V+24,95.

Having turned them on, which voice are we going to use and how are we to select the cut off frequency? There are three more registers to consider now, namely V+21, V+22 and V+23. We'll look at the latter first.

128	064	032	016	008	004	002	001
007	006	005	004	003	002	001	000
4	4	4	4	0	3	2	1

We'll ignore bit three, since that is used *only* for an external input, and we're not about to turn *Your Commodore* into a maze of circuit diagrams.

Quite simply, turning on bit zero will select voice one to be filtered, turning on bit one will select voice two to be filtered, and turning on bit two will select voice three to be filtered. Turning on all the bits will select all three voices to be filtered, and any combination can be chosen as you see fit.

Bits four to seven determine the filter resonance, that is, the amount of resonance that one can expect with respect to the cut off frequency. Being a four bit number it can contain any value between 0 and 32, and rather like our discussion on ADSR it is easiest to think of it this way, multiplying the value in the range 0 to 32 to find out which value should really be POKEd in there.

Finally we have to select the cut off frequency, and this is determined by using control registers V+21 and V+22.

128	064	032	016	008	004	002	001
007	006	005	004	003	002	001	000
1	1	1	1	1	1	1	1

128	064	032	016	008	004	002	001
007	006	005	004	003	002	001	000
0	0	0	0	0	1	1	1
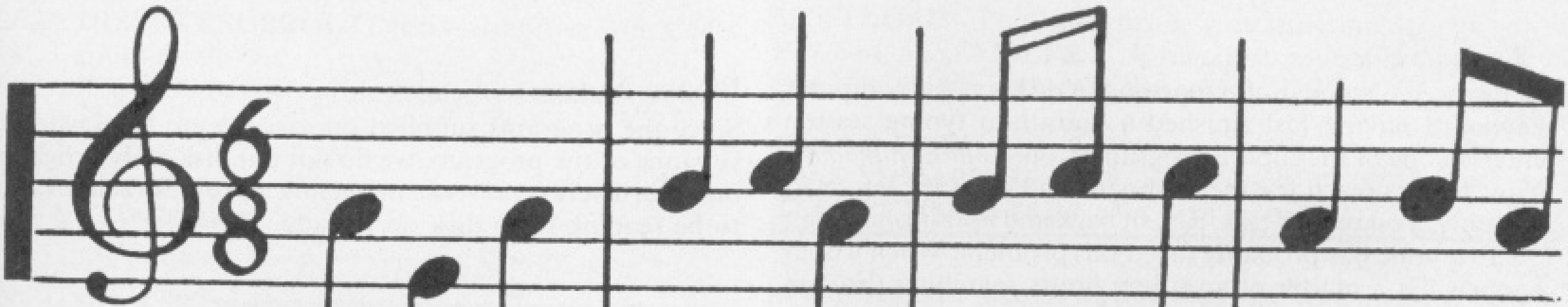
Top register=V+22, or 54294.
Bottom register=V+21, or 54293.

All eight bits of the top register are used, meaning that values between 0 and 255 can be stored there. Only the first three bits of the bottom register are used, which means that values in the range 0 to 7 can be put in there. This latter works in an analogous way to our high value and low value frequencies already encountered, so that to get the true frequency we must multiply the value in register (V+21) by 256 and then add the value found in register (V+22). Remember that these are write-only registers, and any values that are to be POKEd in there or PEEKed out of there must be kept in a separate variable.

As an example, if we wanted to use a cut off frequency of 1000 hertz (the two locations combined give us a range of 0 to 2047), then we must find the integer result of dividing 1000 by 256, which equals 3, then find the result of subtracting 256 times 3 from 1000, or 232. Thus we would POKE V+21,3:POKE V+22,232.

This is one of the many things on the SID chip that is best explained by diagrams, programs and just listening to the effects – watch this space and we'll explain further in our next installment of Making Music.

YC



LIFESAVERS 9	C64	OLD	1/1

One of the most useful commands that is missing from the C64 Basic is OLD. This allows any Basic program to be recovered after a NEW or system reset (SYS 64738).

This OLD instruction works by simply restoring the original start and end of program values into memory locations 43,44,45 and 46 as well as restoring values in at the original start of the Basic program, e.g line number start, start of program, end of program etc.

You could save OLD as a machine code file and recall it as needed, without using the Basic loader.

SYS 400 to start the OLD program.

```
10 REM *******************
20 REM     OLD ROUTINE
30 REM *******************
40 BL=1:LN=50:SA=400
50 FOR L=0 TO BL:CX=0:FOR D=0 T
O 15:READ A:CX=CX+A:POKE SA+L*1
6+D,A:NEXT D
60 READ A:IF A><CX THENPRINT"ER
ROR IN LINE";LN+(L*10):STOP
70 NEXT L:END
80 DATA 160,1,169,255,145,43,32
,51,165,24,169,2,101,34,133,45,
1529
90 DATA 169,0,101,35,133,46,72,
94,166,0,0,0,0,0,0,0,816
100 PRINT "SYS 400 TO ACTIVATE
OLD ROUTINE"
```

Software for Sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in then our software service will help you out

It's three o'clock in the morning. You sit at the computer keyboard having just finished a marathon typing session entering one of the superb programs from *Your Commodore*. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, 5 River Park Estate, Berkhamsted, Herts HP4 1HL.
Tel: (04427) 76661

Please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:

This symbol means that the program is available on cassette.

These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk-only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

NOVEMBER 1987

ADVENTURE KIT II — The second part of our C64 adventure writing kit.
KERNAL II — A pull-down menu system giving easy file handling. (C64)
FUNCTION KEY TEMPLATE — Use the Commodore plotter to produce templates on your C64.
PLUS/4 AND C16 DISK MENU — Access your disk files with ease (disk only).
128 PREFERENCES — Predefine your computer's default characteristics.
NUMBER TUMBLE — A frustrating game for the C64.

ORDER CODE
DISK YDNOV87 £6.00
TAPE YCNOV87 £4.00

DECEMBER 1987

DISKIT 8 — A memory clear routine for use with our Turbo Cruncher from March 1987 (Disk only).
DISK MANAGER — Pop-Up disk commands at your fingertips (C64, disk only).
RELOCATOR — Alter the load address of your programs (C64).
8 SPEED SCROLL — Powerful machine code scroll routine (C64).
TYPRO — A Plus/4 text editor (Disk only).
EASY COUNT — A word count facility for Easy Script users.
BUDGET CALC — Keep track of your finances (C64, disk only).
SPRITE LIBRARY — The first part of our sprite collection (C64).
LISTER 128 — Produce neat C128 listing with this program (C128, disk only).
TRACK/SECTOR EDITOR — A powerful disk editor (C64,

disk only).
DIR COVER — Produce your own detailed disk sleeves (C64 plus disk and printer).
1541 FAST LOADER — Improve your loading time (C64, disk only).
MENU MAKER — A menu generator for C64 owners (Disk only).

ORDER CODE
DISK YDDEC87 £6.00
TAPE YCDEC87 £4.00

JANUARY 1988

80 CHARACTER PRINTOUT — Give your C64 80 columns.
QUESTIONNAIRE 1 — An excellent quiz generator for the C64.
ACKROYD'S SAGA— A mathematical educational adventure (C64).
ENLARGING THE 64 — Create large characters on the C64.
ARRAY DISPLAY SUBROUTINES — Improve your C64's INPUT routine.
C64 TAPE SYSTEM — Provide menu driven access to your C64 cassettes.

ORDER CODE
DISK YDJAN88 £6.00
TAPE YCJAN88 £4.00

FEBRUARY 1988

ACKROYD'S SAGA — See January 1988
ULTRA FUNCTION KEYS — Store up to one screen of text on your C64 function keys.
INPUT CLEAN UP — Improved INPUT routine for C128 users.
ADVENTURE KIT — The parser module for our DIY adventure series.
MORSE CODE TUTOR — Teach yourself morse code with this program for the C64.
GET THE POINT — A simple joystick driven pointer for C64 users.

ORDER CODE
DISK YDFEB88 £6.00
TAPE YCFEB88 £4.00

MARCH 1988

LABEL LINKER - Create a library of C128 programs (C128 disk only).
MULTI DUMP - Epson screen dump for C64 owners.
WEOS II - Continuation of program from February 1988. Complete program on this disk or tape.
MUSI LOAD - Play music while your programs load (C64).
PLUS/4 ASSEMBLER - A machine code assembler for Plus/4 users (available on disk only).

ORDER CODE
DISK YDMAR88 £6.00
TAPE YCMAR88 £4.00

Cassettes or disks are available from March 1986. Please ring the editorial office (01-437 0626) for details of these.

ORDER FORM — PLEASE COMPLETE IN BLOCK CAPITALS

NAME	QTY	TAPE/DISK	ORDER CODE	PRICE
APRIL '88		**TAPE (£4.00)**	**YCAPR88**	
APRIL '88		**DISK (£6.00)**	**YD APR88**	
OVERSEAS POST £1				
			TOTAL	

NAME. . . . .

ADDRESS. . . . .

POSTCODE. . . . .

I enclose a cheque/postal order for £. . . . . . made payable to ARGUS SPECIALIST PUBLICATIONS LTD.

All orders should be sent to: YOUR COMMODORE, READERS SERVICES, ARGUS SPECIALIST PUBLICATIONS, 9 HALL ROAD, HEMEL HEMPSTEAD, HERTS HP2 7BH.
Please allow 28 days for delivery.

Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blobs which send you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. Fret no more, it's all part of our easy entry aid.

Instead of those nasty graphics and rows of countless spaces in PRINT statements and strings we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an ace of spades in layman's terms, and [SA10] would mean a row of ten of these symbols.

[S+2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realise that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacebar four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as:

[CTRL N, DOWN2,LEFT5,BLUE, F3,C3]

This would be achieved by holding down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the F3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS],[C*]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 2) and delete it. This gets the computer out of quotes mode. Hold down CTRL and press the number nine key (RVSON), type the relevant number of reversed T's and then hold down CTRL and press zero (RVSOFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string: the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

:CC=2*[PI]*R:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie. the pi symbol).

PROGRAM: SYNTAX CHECKER

```
5 REM SYTAX CHECKER - ERIC DOYLE

10 BL=10   :LN=70   :SA=49152
20 FOR L=0 TO BL:CX=0:FOR D=0 TO
 15
30 READ A:IF A>255THENPRINT"NUMB
ER TO LARGE";LN+(L*10):STOP
40 CX=CX+A:POKE SA+L*16+D,A:NEXT
 D
50 READ A:IF A><CX THENPRINT"ERR
OR IN LINE";LN+(L*10):STOP
60 NEXT L:SYS 49152:NEW
70 DATA 173,5,3,201,165,208,31,1
20,169,9,141,32,208,141,33,208,1
847
80 DATA 169,7,141,134,2,169,13,3
2,210,255,169,64,141,4,3,169,168
2
90 DATA 192,141,5,3,88,96,120,16
9,124,141,4,3,169,165,141,5,1566

100 DATA 3,169,14,141,134,2,141,
32,208,169,6,141,33,208,88,96,15
85
110 DATA 32,124,165,72,138,72,15
2,72,162,0,165,20,133,254,165,21
,1747
120 DATA 24,101,254,133,254,189,
0,2,240,18,69,254,133,254,232,18
9,2346
130 DATA 0,2,240,8,24,101,254,13
3,254,232,208,233,169,1,141,134,
2134
140 DATA 2,165,254,74,74,74,74,3
2,156,192,32,210,255,165,254,41,
2054
150 DATA 15,32,156,192,32,210,25
5,169,13,32,210,255,169,13,32,21
0,1995
160 DATA 255,169,7,141,134,2,104
,168,104,170,104,96,24,105,48,20
1,1832
170 DATA 58,16,1,96,24,105,7,96,
0,0,0,0,0,0,0,0,403
```

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk immediately because it will be used with most of the present and future listings appearing in Your Commodore.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and press RETURN again.

If you want to turn off the checker simply type SYS49152 and the screen will return to the familiar blue colours. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SYS command.

No system is foolproof but the chances of two errors cancelling one Many of the listings are presented in lower case. To turn your computer to lower case mode press the Commodore key and the SHIFT key at the same time. YC

Mnemonic	Symbol	Keypress
[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		f1 key
[F2]		SHIFT & f1 key
[F3]		f3 key
[F4]		SHIFT & f3 key
[F5]		f5 key
[F6]		SHIFT & f5 key
[F7]		f7 key
[F8]		SHIFT & f7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic	Symbol	Keypress
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LARROW]		←
[UPARROW]		↑
[PI]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		see text
[Cletter]		CBM + letter
[Sletter]		SHIFT + letter

YOUR

COMMODORE Listings

AUTOSTART

PROGRAM: AUTO START MAIN

```
AE  10 REM  **** C64 AUTO-START
     MAKER ****
98  20 REM **** FOR THE COMMODOR
     E 64 ******
D9  30 REM  **** BY KEVIN GODDEN
     1987 ****
12  40 :
08  50 :
06  60 :
17  70 POKE157,0:PRINT"[CLR]":PO
     KE53280,0:POKE53281,0
B2  80 IFPEEK(49152)<>76ANDPEEK(
     59154)<>192THENLOAD"MAKERM/C
     ",8,1
40  90 IFPEEK(32768)<>169THENLOA
     D"SCREEN.ED",8,1
90  100 POKE52,24:POKE56,24:PRIN
     T"[CLR]":SYS49152+12:GOTO430

54  110 REM ****  COMMENCE-AUTO
     START PROCENURES (PART II)
B7  120 PRINT"[CLR,WHITE,DOWN2]"

51  130 PRINTTAB(10);"[C7]AUTO-S
     TART MAKER[DOWN,LEFT16,CT16.
     WHITE]"
B6  140 :
08  150 REM ** LINES 170-230 REA
     DS THE BASIC PROGRAM  **
9A  160 :
38  170 INPUT"[DOWN2]PROGRAM NAM
     E";NM$
79  180 PRINT"[DOWN2]INSERT SOUR
     CE DISK  [RVSON,YELLOW]RETUR
     N[RVSOFF,WHITE]"
31  190 GETA$:IFA$<>CHR$(13)THEN
     190
FF  200 PRINT"[DOWN2]READING: ";
     NM$
1B  210 SYS49152+21NM$+"",8:OPEN
     15,8,15:INPUT#15,A$:CLOSE15:
     IFA$="00"THEN230
2D  220 PRINT"[DOWN2]DISK ERROR!
     !":GOTO170
F1  230 Y=(PEEK(828)+256*PEEK(82
     9))+1
CA  240 :
9C  250 REM ** LINES 270-390 WRI
     TES THE AUTO-STARTED PROGRAM
      **
3F  260 :
B6  270 INPUT"[DOWN4]NAME FOR PR
     OGRAM";NM$
62  280 PRINT"[DOWN2]INSERT TARG
     ET DISK  [RVSON,YELLOW]RETUR
     N[RVSOFF,WHITE]"
39  290 GETA$:IFA$<>CHR$(13)THEN
     290
96  300 : PRINT"[DOWN2]WRITING:
     ";NM$
9D  310 SYS49152"@:"+NM$,8,8
43  320 SYS49152+3,2
4B  330 SYS49152+3,3:SYS49152+3,
     60:SYS49152+3,3
F6  340 FORT=772TO827:SYS49152+3
     ,PEEK(T):NEXT
C9  350 FORT=0TO12:READA:SYS4915
     2+3,A:NEXT:SYS49152+15
9A  360 FORT=841TO1023:SYS49152+
     3,0:NEXT:FORT=1024TO2048:SYS
     49152+3,PEEK(T):NEXT:
AC  370 FORT=(24*256)+5OTOY:SYS4
     9152+3,PEEK(T):NEXT:SYS49152
     +6
C5  380 DATA 169,131,141,2,3,169
     ,164,141
6B  390 DATA 3,3,76,174,167
AB  400 :
3C  410 REM ****  MAIN MENU ****

9F  420 :
2E  430 POKE53280,2:POKE53281,0
5D  440 PRINT"[CLR,DOWN2]"TAB(10
     )"[GREEN]C64 AUTO-START MAKE
     R"
D5  450 PRINTTAB(10)"[CT20]"
D0  460 PRINTTAB(13)"+ SCREEN ED
     ITOR"
FA  470 PRINTTAB(11)"[DOWN,YELLO
     W]BY KEVIN GODDEN"
A5  480 PRINT"[DOWN2] [RVSON,YEL
     LOW]F1[RVSOFF,C7] COMMENCE A
     UTO-START PROCEDURE"
8B  490 PRINT"[DOWN] [RVSON,YELL
     OW]F2[RVSOFF,C7] DESIGN LOAD
     ING SCREEN"
52  500 PRINT"[DOWN] [RVSON,YELL
     OW]F3[RVSOFF,C7] LOAD LOADIN
     G SCREEN"
0E  510 PRINT"[DOWN] [RVSON,YELL
     OW]F4[RVSOFF,C7] SAVE LOADIN
     G SCREEN"
94  520 PRINT"[DOWN] [RVSON,YELL
     OW]F5[RVSOFF,C7] READ DIRECT
     ORY"
B5  530 PRINT"[DOWN] [RVSON,YELL
     OW]F6[RVSOFF,C7] READ DISKST
     ATUS"
E0  540 GETA$:IFA$=""THEN540
EB  550 IFA$="[F1]"THEN940
48  560 IFA$="[F2]"THEN1090
86  570 IFA$="[F3]"THEN650
A6  580 IFA$="[F4]"THEN700
86  590 IFA$="[F5]"THENGOSUB850:
     GOTO430
50  600 IFA$="[F6]"THEN990
46  610 GOTO540
54  620 :
D5  630 REM ****  LOAD SCREEN  *
     ***
B8  640 :
AA  650 A=1:INPUT"[CLR,DOWN4]SCR
     EEN NAME";NM$:SYS49152+18NM$
     ,8,8
2A  660 SYS49152+12:GOTO430
9A  670 :
88  680 REM ****  SAVE SCREEN  *
     ***
8E  690 :
39  700 PRINTTAB(9)"[CLR,DOWN3,G
     REEN]SAVE LOADING SCREEN"
8D  710 INPUT"[DOWN]HAVE YOU DES
     IGNED OR LOADED  A SCREEN[SP
     C3]YET Y/N";YN$
06  720 IFYN$="Y"THEN 770
35  730 PRINT"[DOWN2,YELLOW]PLEA
     SE DESIGN OR LOAD A LOADING
     SCREEN  BEFORE USING THIS OP
```

```
    TION."
2D  740 PRINT"[DOWN2,GREEN]PRESS
     ANY KEY TO CONTINUE"
81  750 GETA$:IFA$=""THEN750
C4  760 GOTO430
0E  770 INPUT"[DOWN]SCREEN NAME"
    ;NM$
EA  780 PRINT"[DOWN2]WRITING ";N
    M$
34  790 SYS49152"@:"+NM$,8,8:SYS
    49152+15
80  800 SYS49152+3,0:SYS49152+3,
    4:FORT=1024TO2023:SYS49152+3
    ,PEEK(T):NEXT:SYS49152+6
1B  810 GOTO430
0D  820 :
E7  830 REM ****  READ DIRECTORY
      ****
71  840 :
77  850 OPEN2,8,15,"I":PRINT"[YE
    LLOW]":SYS49152+9:PRINT"[DOW
    N2,GREEN] PRESS ANY KEY TO C
    ONTINUE"
E8  860 GETA$:IFA$=""THEN860
4F  870 CLOSE2:RETURN
49  880 :
47  890 :
BD  900 :
A6  910 REM ****  COMMENCE AUTO-
    START PROCEDURE  ****
A1  920 :
9F  930 :
77  940 PRINT"[CLR,DOWN2]  [GREE
    N]  COMMENCE AUTO START PROC
    EDURES"
5D  950 PRINT" [RIGHT3,CT30]"
57  960 INPUT"[DOWN2]HAVE YOU DE
    SIGNED OR LOADED A LOADING[S
    PC3]SCREEN YET Y/N";YN$
87  970 IFYN$<>"Y"THEN730
ED  980 GOTO120
BA  990 OPEN15,8,15:INPUT#15,A$,
    B$,C$,D$:CLOSE15
43  1000 PRINT"[DOWN,YELLOW]"A$"
    ,"B$","C$","D$
E5  1010 PRINT"[DOWN,GREEN]PRESS
     ANY KEY TO CONTINUE"
B9  1020 GETA$:IFA$=""THEN1020
86  1030 PRINT"[UP,SPC26]"
A2  1040 PRINT"[UP3,SPC29,UP2]"
28  1050 GOTO540
12  1060 :
F0  1070 REM ****  SCREEN DESIGN
    ER  ****
06  1080 :
B6  1090 PRINT"[GREEN,CLR,DOWN10
    ,RIGHT5]TO EXIT THE EDITOR,
    PRESS [RVSON]F1[RVSOFF]"
9F  1100 PRINT"[C7,DOWN6,RIGHT6]
    PRESS ANY KEY TO CONTINUE"
D6  1110 GETA$:IFA$=""THEN1110
A6  1120 PRINT"[CLR,DOWN26,C5,SV
    40]"
B0  1130 :FORI=0TO21:PRINT:NEXT
29  1140 SYS 49152+15:SYS 32768
36  1150 SYS49152+12:GOTO430
```

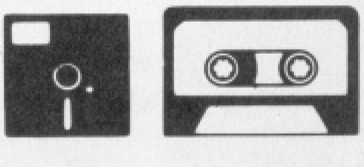
PROGRAM: DATA LOADER

```
48  10 REM DATA LOADER, PLEASE T
    YPE LINE NUMBERS AS PRINTED.

94  20 POKE53280,6:POKE53281,0:P
    RINT"[CLR,DOWN2,YELLOW]PLEAS
    E WAIT..."
2F  30 S=49152:P=0:SA=S
2A  40 S2=32768:SLN=2000:ELN=226
    0:LLN=2300:SELN=2840
75  50 FORL=SLNTOELNSTEP10:CHK=0
    :FORT=0TO15:READD:POKES,D
27  60 S=S+1:CHK=CHK+D:NEXTT
99  70 READCMP
C4  80 IFCHK<>CMP THEN PRINT"[DO
    WN2,YELLOW]DATA ERROR IN LIN
    E:"L:END
B7  90 NEXTL:P=P+1
5E  100 :
06  110 IFP>1THEN 130
E6  120 POKE53280,0:E1=S:SLN=LLN
    :ELN=SELN:S=S2:GOTO50
42  130 PRINT"[DOWN2]INSERT TARG
    ET DISK [RVSON]RETURN[RVSOFF
    ]"
21  135 GETA$:IFA$=""THEN135
3E  140 SYSSA"@:MAKERM/C",8,1
AD  150 SYSSA+3,0:SYSSA+3,192:FO
    RT=SATOE1:SYSSA+3,PEEK(T):NE
    XT:SYSSA+6
BE  160 SYSSA"SCREEN.ED",8,1
75  170 SYSSA+3,0:SYSSA+3,128:FO
    RT=32768TOS:SYS49152+3,PEEK(
    T):NEXT:SYS49152+6
80  180 PRINT"[DOWN,GREEN]DATA T
    RANSFER COMPLETE":END
54  2000 DATA76,176,192,76,219,1
    92,76,238,192,76,24,192,76,2
    42,192,76,2315
A2  2010 DATA22,193,76,58,193,76
    ,137,193,169,147,32,210,255,
    169,17,162,2109
93  2020 DATA24,32,210,255,202,2
    08,250,169,29,32,210,255,169
    ,36,133,251,2465
8A  2030 DATA169,251,133,187,169
    ,0,133,188,169,1,133,183,169
    ,8,133,186,2212
FB  2040 DATA169,96,133,185,32,2
    13,243,165,186,32,180,255,16
    5,185,32,150,2421
C1  2050 DATA255,160,3,132,251,3
    2,165,255,133,252,164,144,20
    8,62,32,165,2413
12  2060 DATA255,164,144,208,55,
    164,251,136,208,233,166,252,
    32,205,189,169,2831
6C  2070 DATA32,32,210,255,32,16
    5,255,166,144,208,33,170,240
    ,16,32,210,2200
2A  2080 DATA255,32,159,255,32,2
    28,255,201,0,240,233,76,160,
    192,169,13,2500
FD  2090 DATA32,210,255,169,29,3
    2,210,255,160,2,208,183,32,6
    6,246,96,2185
3F  2100 DATA32,159,255,32,228,2
    55,201,0,208,3,76,160,192,76
    ,116,192,2185
61  2110 DATA32,212,225,169,8,32
    ,186,255,165,183,166,187,164
    ,188,32,189,2393
1C  2120 DATA255,169,97,133,185,
    164,183,32,213,243,165,186,3
    2,12,237,165,2471
9D  2130 DATA185,32,185,237,96,1
    69,8,32,147,255,96,32,253,17
    4,32,158,2091
00  2140 DATA183,138,32,221,237,
    173,32,208,73,1,141,32,208,9
    6,32,63,1870
3C  2150 DATA246,96,169,0,133,25
    1,169,4,133,252,169,170,133,
    253,169,193,2540
A7  2160 DATA133,254,160,0,177,2
    51,145,253,200,208,249,230,2
    54,230,252,165,3161
30  2170 DATA252,201,8,208,237,9
    6,169,0,133,251,169,4,133,25
    2,169,170,2452
84  2180 DATA133,253,169,193,133
    ,254,160,0,177,253,145,251,2
    00,208,249,230,3008
1B  2190 DATA254,230,252,165,252
    ,201,8,208,237,96,32,64,193,
    76,91,193,2552
E5  2200 DATA32,212,225,169,96,1
    33,185,32,213,243,165,186,32
    ,180,255,165,2523
E3  2210 DATA185,32,150,255,32,1
    65,255,32,165,255,96,169,0,1
    33,251,169,2344
79  2220 DATA4,133,252,160,0,32,
    165,255,145,251,165,144,208,
    14,200,208,2336
23  2230 DATA244,230,252,165,252
    ,201,8,240,3,76,101,193,165,
    251,141,60,2582
8F  2240 DATA3,165,252,141,61,3,
    76,66,246,32,64,193,169,50,1
    33,251,1905
C6  2250 DATA169,24,133,252,160,
    0,32,165,255,145,251,165,144
    ,208,221,230,2554
65  2260 DATA251,165,251,208,241
    ,230,252,76,150,193,199,199,
    199,199,199,199,3211
DC  2270 :
C0  2280 REM END OF MAKERM/C
C0  2290 :
D8  2300 DATA169,0,141,86,131,16
    9,12,141,32,208,160,0,140,33
    ,208,160,1790
06  2310 DATA12,140,134,2,32,110
    ,130,32,95,130,133,157,169,1
    ,141,54,1472
64  2320 DATA128,141,53,128,120,
    169,62,162,128,141,20,3,142,
    21,3,88,1509
20  2330 DATA76,65,131,0,0,1,0,0
    ,0,0,0,0,0,80,160,0,513
00  2340 DATA173,53,128,201,1,24
    0,3,76,160,128,32,30,130,197
    ,60,208,1820
E6  2350 DATA6,165,57,197,59,240
    ,16,173,55,128,145,59,177,57
    ,141,55,1730
79  2360 DATA128,32,214,130,76,1
    37,128,173,54,128,201,1,208,
    27,238,60,1935
D7  2370 DATA128,173,60,128,201,
    20,176,3,76,160,128,169,0,14
    1,60,128,1751
58  2380 DATA177,57,73,128,145,5
    7,76,160,128,173,55,128,24,1
    05,128,144,1758
DC  2390 DATA9,177,57,41,127,145
    ,57,76,160,128,177,57,9,128,
    145,57,1550
62  2400 DATA76,49,234,0,0,0,0,4
    0,40,25,25,32,173,86,131,240
    ,1151
38  2410 DATA1,96,173,56,128,141
    ,57,128,173,58,128,141,59,12
    8,32,196,1695
11  2420 DATA128,76,172,128,32,2
    28,255,208,1,96,141,171,128,
    201,29,240,2234
FA  2430 DATA58,201,157,240,57,2
    01,145,240,35,201,17,240,52,
    201,13,240,2298
3A  2440 DATA30,201,20,240,29,20
    1,147,240,28,201,19,240,27,2
    01,18,240,2082
F0  2450 DATA35,201,146,240,31,2
    01,133,240,30,76,29,129,76,1
    00,129,76,1872
1E  2460 DATA236,129,76,156,130,
    76,20,130,76,76,130,76,36,12
```

```
     9,76,56,1608
DA   2470 DATA129,76,82,129,76.13
     .130,76.87,131,76,13,131,201
     ,148,240,1738
DE   2480 DATA249,76,124,129,238.
     56,128,173,56,128,205,167,12
     8,208,52,173,2290
57   2490 DATA163,128,141,56,128.
     76,82,129,206,56,128,173,56.
     128,168,200,2018
98   2500 DATA152,205,163.128,208
     ,29,173,167,128,168.136,152.
     141.56,128,76,2210
05   2510 DATA100,129,238,58,128.
     173,58,128,205,169.128,208,6
     ,173,165.128.2194
EF   2520 DATA141,58,128,96.206,5
     8,128,173,58,128,168,200.152
     ,205.165,128,2192
72   2530 DATA208.241,173,169.128
     ,168,136,152,141,58,128,96,7
     2,32,247,130.2279
08   2540 DATA174,246,130,224,1.2
     08,2,104,96.173,58,128,201,2
     4,208,73,2050
C0   2550 DATA173,56,128,201.39.2
     08,66,120,32,95.130,160,0.10
     4,141,60,1713
A2   2560 DATA3,177,57,141,61,3,3
     2,30,130.32,245,129,173,60.3
     ,32,1308
DF   2570 DATA210,255,160,0,177,5
     7,141,60,3.173,61,3,145,57,1
     69,39,1710
1B   2580 DATA141,56.128,169.24,1
     41,58,128,32,30,130,160,0,17
     3,60.3,1433
98   2590 DATA145.57.141,55,128.8
     8,76,95,130,32,245.129,104,1
     20,32,210,1787
E7   2600 DATA255,160,0,177,57,14
     1,55,128,88.76,36,129,173,16
     3,128,141.1907
4E   2610 DATA56,128,76,82,129,17
     2.56,128,174,58.128,24.76.24
     0,255,56,1838
FD   2620 DATA32,240,255.140,56,1
     28,142,58,128,96.0,0,0,165.1
     99,73,1712
5A   2630 DATA1,133,199,96,120,16
     9,147,32,210.255,88.76.0,128
     ,172,58,1884
9E   2640 DATA128.169.0.162,4,133
     ,57,134,58,192.0.240.16,165.
     57,24,1539
84   2650 DATA105,40,133,57,165,5
     8,105,0,133,58,136.208.240,1
     65,57,24,1684
BF   2660 DATA109,56,128.133,57.1
     65,58,105,0,133,58,96,173,58
     ,128,205,1662
03   2670 DATA165,128,208.11,173.
     56,128,205,163,128,208.3,32,
     110,130,173,2021
C4   2680 DATA163,128,141,56,128,
     173,165,128,141.58,128,76,30
     ,130,169,0,1814
FA   2690 DATA141,163,128,141,165
     ,128,169,40,141,167.128,169,
     25,141,169.128.2143
F7   2700 DATA96.173,167.128,24,2
     37,163,128,168,200,152,141.1
     1,130,173,169,2260
4F   2710 DATA128,24,237,165,128,
     168,200,152,141,12,130,96,12
     0,32,129,130,1992
CC   2720 DATA32,56,129,172,56,12
     8,200.204,167,128,208.3,76,2
     35,130,32,1956
F0   2730 DATA30,130,32,214,130,1
     72,167,128,200,152,24,237,56
     ,128,141,11,1952
93   2740 DATA130,160,1,177,57,13
     6,145,57,200,200,204,11,130,
     208,244,169,2229
1E   2750 DATA32,136,145,57,88,96
     ,165,57,133,59,165,58,133,60
     ,96,206,1686
4B   2760 DATA32,208,32,228,255,2
     40,251,238,32,208,96,32,30,1
     30,160,0,2172
39   2770 DATA169,32,145,57,88,96
     ,0,162,0,142,246,130,232,201
     ,32,144,1876
9B   2780 DATA8,201,128,144,7,201
     ,160,176,3,142,246,130,96,12
     0,32,129,1923
A2   2790 DATA130,32,30,130,32,53
     ,131,172,11,130,136,177,57,2
     00,145,57,1623
45   2800 DATA136,136,208,247,173
     ,55,128,160,1,145,57,169,32,
     136,141,55,1979
0F   2810 DATA128,145,57,88,96,17
     2,167,128,152,24,237,56,128,
     141,11,130,1860
34   2820 DATA96,169,1,141,85,131
     ,160,0,177,59,141,55,128,169
     ,1,141,1654
B7   2830 DATA53,128,76,172,128,0
     ,0,120,169,49,141,20,3,169,2
     34,141,1603
30   2840 DATA21,3,160,0,173,55,1
     28,145,57,200,141,86,131,88,
     96,199,1683
17   2850 :
68   2860 REM    +++++++++++++++++
     +++++++
35   2870 REM    +    SCREEN EDITO
     R     +
15   2880 REM    +   AND I/O ROUTI
     NES   +
BD   2890 REM    + FOR AUTO-START
     MAKER +
1A   2900 REM    + BY KEVIN GODDEN
      1987 +
96   2910 REM    +++++++++++++++++
     +++++++
```

GYROSPEED



PROGRAM: GYRO

```
93   10 FORL=ØTO308:CX=Ø:FORD=ØTO
     15:READA:CX=CX+A:POKE2049+L*
     16+D,A:NEXTD
45   20 READA:IFA<>CXTHENPRINT"ER
     ROR IN LINE";4Ø+(L*1Ø):STOP
E8   3Ø NEXTL
9A   4Ø DATA11,8,1Ø,Ø,158,5Ø,48,5
     4,49,Ø,Ø,Ø,169,72,133,251,1Ø
     13
49   5Ø DATA169,8,133,252,169,Ø,1
     33,253,169,224,133,254,16Ø,Ø
     ,177,251,2485
C6   6Ø DATA145,253,2ØØ,2Ø8,249,2
     3Ø,252,23Ø,254,165,252,2Ø1,2
     8,144,239,169,3219
ØB   7Ø DATA8,32,21Ø,255,169,226,
     141,Ø,3,169,252,141,1,3,12Ø,
     169,1899
51   8Ø DATA53,133,1,88,76,Ø,224,
     169,54,141,4Ø,3,169,188,141,
     41,1521
62   9Ø DATA3,169,226,141,6,3,169
     ,252,141,7,3,32,124,231,32,1
     52,1691
52   1ØØ DATA231,32,232,7,32,52,2
     24,32,252,228,32,18Ø,228,32,
     96,231,2121
4D   11Ø DATA32,177,226,169,217,1
     41,18,2Ø8,76,167,2,169,Ø,141
     ,32,2Ø8,1983
27   12Ø DATA141,33,2Ø8,169,199,1
     41,22,2Ø8,162,39,169,16Ø,157
     ,Ø,4,157,1969
29   13Ø DATA16Ø,4,157,48,6,157,1
     12,7,157,152,7,157,192,7,169
     ,2,1494
9A   14Ø DATA157,Ø,216,157,16Ø,21
     6,157,48,218,157,112,219,157
     ,152,219,157,25Ø2
F5   15Ø DATA192,219,2Ø2,16,213,1
     69,16Ø,141,4Ø,4,141,8Ø,4,141
     ,12Ø,4,1846
Ø8   16Ø DATA141,77,4,141,117,4,1
     41,157,4,169,2,141,4Ø,216,14
     1,8Ø,1575
15   17Ø DATA216,141,12Ø,216,141,
     77,216,141,117,216,141,157,2
     16,162,35,169,2481
6E   18Ø DATA16Ø,157,41,4,157,81,
     4,157,121,4,169,1Ø,157,41,21
     6,157,1636
EA   19Ø DATA81,216,157,121,216,2
     Ø2,16,231,162,32,189,251,224
     ,41,191,157,2487
1B   2ØØ DATA27,5,189,28,225,41,1
     91,157,1Ø7,5,189,61,225,41,1
     91,157,1839
EE   21Ø DATA187,5,189,94,225,41,
     191,157,131,6,189,127,225,41
     ,191,157,2156
FA   22Ø DATA211,6,189,16Ø,225,41
     ,191,157,35,7,169,1,157,27,2
     17,157,195Ø
9D   23Ø DATA1Ø7,217,157,187,217,
     157,131,218,157,211,218,157,
     35,219,2Ø2,16,26Ø6
A4   24Ø DATA185,96,32,32,32,32,3
     2,32,32,84,85,82,66,79,32,84
     ,1Ø17
FC   25Ø DATA65,8Ø,69,32,85,84,73
     ,76,73,84,89,32,32,32,32,32,
     97Ø
67   26Ø DATA32,32,32,32,32,32,32
     ,32,87,82,73,84,84,69,78,32,
     845
1E   27Ø DATA66,89,32,71,46,32,83
     ,65,85,78,68,69,82,83,32,32,
     1Ø13
5D   28Ø DATA32,32,32,32,32,32,32
     ,32,32,4Ø,67,41,49,57,56,55,
     653
13   29Ø DATA32,89,79,85,82,32,67
     ,79,77,77,79,68,79,82,69,32,
     11Ø8
23   3ØØ DATA32,32,32,32,32,91,7Ø
     ,49,93,32,32,76,79,65,68,32,
     847
5F   31Ø DATA8Ø,82,79,71,82,65,77
     ,32,7Ø,82,79,77,32,84,65,8Ø,
     1137
53   32Ø DATA69,47,68,73,83,75,91
     ,7Ø,51,93,32,32,83,65,86,69,
```

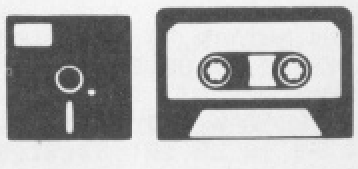
```
    1087
F9  330 DATA32,80,82,79,71,82,65
    ,77,32,84,79,32,84,65,80,69,
    1093
C7  340 DATA32,32,32,32,32,32,32
    ,91,70,53,93,32,32,81,85,73,
    834
C6  350 DATA84,32,32,32,32,32,32
    ,32,32,32,32,32,32,32,32,32,
    564
3D  360 DATA32,32,32,32,32,32,32
    ,32,96,169,254,141,0,220,174
    ,1,1311
47  370 DATA220,224,239,240,9,22
    4,223,240,8,224,191,240,7,96
    ,76,10,2471
1D  380 DATA229,76,30,229,76,83,
    229,120,169,55,133,1,169,196
    ,141,20,1956
7F  390 DATA3,169,2,141,21,3,162
    ,0,142,14,220,232,142,26,208
    ,234,1719
95  400 DATA88,76,193,2,169,1,14
    1,25,208,234,169,53,133,1,32
    ,50,1575
C4  410 DATA226,169,55,133,1,234
    ,76,129,234,120,169,49,141,2
    0,3,169,1928
61  420 DATA234,141,21,3,162,1,1
    42,14,220,202,142,25,208,142
    ,26,208,1891
57  430 DATA142,21,208,120,169,5
    3,133,1,96,173,18,208,201,25
    5,240,29,2067
68  440 DATA169,91,141,17,208,16
    9,255,141,18,208,173,179,228
    ,141,22,208,2368
E5  450 DATA32,106,226,32,194,22
    5,173,22,208,141,179,228,96,
    169,199,141,2371
87  460 DATA22,208,169,27,141,17
    ,208,169,217,141,18,208,104,
    104,76,72,1901
63  470 DATA1,174,22,208,202,224
    ,191,240,4,142,22,208,96,162
    ,199,142,2237
00  480 DATA22,208,162,0,189,153
    ,7,157,152,7,189,153,219,157
    ,152,219,2146
24  490 DATA232,224,39,208,239,1
    60,0,177,251,41,191,9,128,14
    1,191,7,2238
85  500 DATA32,162,226,169,1,141
    ,191,219,96,230,251,208,2,23
    0,252,160,2570
FB  510 DATA0,177,251,201,255,24
    0,1,96,169,186,133,251,169,2
    26,133,252,2740
F7  520 DATA96,32,32,87,69,76,67
    ,79,77,69,32,84,79,32,71,89,
    1071
4E  530 DATA82,79,83,80,69,69,68
    ,32,45,32,65,32,78,69,87,32,
    1002
49  540 DATA84,85,82,66,79,32,76
    ,79,65,68,73,78,71,32,83,89,
    1142
59  550 DATA83,84,69,77,32,87,82
    ,73,84,84,69,78,32,66,89,32,
    1121
E0  560 DATA71,46,32,83,65,85,78
    ,68,69,82,83,32,70,82,79,77,
    1102
3E  570 DATA32,49,52,32,77,65,89
    ,32,39,56,55,32,84,79,32,54,
    859
9B  580 DATA32,74,85,76,89,32,39
    ,56,55,46,32,32,71,89,82,79,
    969
44  590 DATA83,80,69,69,68,32,67
    ,65,78,32,66,69,32,85,83,69,
    1047
83  600 DATA68,32,70,79,82,32,65
    ,76,76,32,89,79,85,82,32,83,
    1062
EF  610 DATA76,79,87,32,76,79,65
    ,68,73,78,71,32,83,79,70,84,
    1132
F6  620 DATA87,65,82,69,32,40,68
    ,73,83,75,32,79,82,32,84,65,
    1048
96  630 DATA80,69,41,32,65,83,32
    ,76,79,78,71,32,65,83,32,65,
    983
69  640 DATA78,89,32,70,73,76,69
    ,83,32,68,79,78,39,84,32,79,
    1061
68  650 DATA86,69,82,87,82,73,84
    ,69,32,84,72,69,32,65,82,69,
    1137
4F  660 DATA65,83,58,32,36,48,52
    ,48,48,45,36,48,56,48,48,32,
    783
F4  670 DATA65,78,68,32,36,69,48
    ,48,48,45,36,70,52,48,48,46,
    837
87  680 DATA32,75,69,69,80,32,84
    ,79,32,84,72,69,83,69,32,71,
    1032
D0  690 DATA85,73,68,69,76,73,78
    ,69,83,32,65,78,68,32,89,79,
    1117
36  700 DATA85,32,83,72,79,85,76
    ,68,32,72,65,86,69,32,78,79,
    1093
7D  710 DATA32,80,82,79,66,76,69
    ,77,83,46,32,32,65,67,75,78,
    1039
6E  720 DATA79,87,76,69,68,71,69
    ,77,69,78,84,83,32,77,85,83,
    1187
6D  730 DATA84,32,71,79,32,84,79
    ,32,83,84,69,80,72,69,78,32,
    1060
DB  740 DATA69,76,77,69,82,32,65
    ,78,68,32,65,78,68,89,32,80,
    1060
E8  750 DATA69,84,84,73,84,84,32
    ,87,72,79,32,72,65,86,69,32,
    1104
75  760 DATA71,73,86,69,78,32,77
    ,69,32,71,82,69,65,84,32,83,
    1073
62  770 DATA85,80,80,79,82,84,32
    ,79,86,69,82,32,84,72,69,32,
    1127
0C  780 DATA76,65,83,84,32,70,69
    ,87,32,89,69,65,82,83,46,32,
    1064
14  790 DATA32,32,84,72,65,78,75
    ,83,32,65,76,83,79,32,84,79,
    1051
2D  800 DATA32,65,76,76,32,84,72
    ,69,32,79,84,72,69,82,32,80,
    1036
45  810 DATA69,79,80,76,69,32,87
    ,72,79,32,75,78,79,87,32,77,
    1103
FF  820 DATA69,46,32,32,66,89,69
    ,32,70,79,82,32,78,79,87,33,
    975
34  830 DATA32,32,32,32,32,32,32
    ,32,32,255,0,162,0,169,13,15
    7,1044
67  840 DATA248,7,168,200,152,23
    2,224,3,208,245,162,0,160,0,
    185,246,2440
04  850 DATA228,157,0,208,185,24
    9,228,157,1,208,200,232,232,
    224,6,208,2723
19  860 DATA237,169,7,141,21,208
    ,141,29,208,141,23,208,169,1
    ,141,39,1883
C8  870 DATA208,141,40,208,141,4
    1,208,169,2,141,35,208,96,11
    1,159,207,2115
8F  880 DATA63,63,63,162,0,189,6
    4,242,157,64,3,232,224,192,2
    08,245,2171
2D  890 DATA96,32,217,2,32,232,7
    ,169,85,141,195,230,32,171,2
    30,32,1903
57  900 DATA5,230,76,49,230,32,2
    17,2,32,232,7,169,200,141,22
    ,208,1852
F3  910 DATA32,198,229,32,199,23
    0,165,1,41,16,208,250,169,0,
    141,17,1928
FE  920 DATA208,169,32,141,195,2
    30,169,167,133,251,169,229,1
    33,252,32,179,2689
89  930 DATA230,32,60,231,32,0,4
    ,76,167,2,32,217,2,76,79,1,1
    241
3D  940 DATA88,169,55,133,1,169,
    1,168,174,227,2,32,186,255,1
    73,228,2061
6D  950 DATA2,162,229,160,2,32,1
    89,255,169,0,133,10,32,213,2
    55,173,2016
E5  960 DATA227,2,201,1,208,10,1
    73,61,3,133,43,173,62,3,133,
    44,1477
FF  970 DATA134,45,132,46,120,16
    9,53,133,1,76,248,230,0,0,32
    ,32,1451
D7  980 DATA32,32,32,32,32,32,32
    ,32,32,32,32,32,32,32,169,55
    ,672
A2  990 DATA133,1,169,7,133,186,
    169,1,133,185,173,89,1,162,9
    0,160,1792
73  1000 DATA1,32,189,255,166,45
    ,164,46,169,43,76,221,245,16
    2,0,189,2003
1A  1010 DATA221,229,41,191,157,
    224,5,169,1,157,224,217,232,
    224,40,208,2540
CA  1020 DATA238,76,55,1,80,82,6
    9,83,83,32,39,83,80,65,67,69
    ,1202
78  1030 DATA39,32,87,72,69,78,3
    2,82,69,65,68,89,32,84,79,32
    ,1009
DF  1040 DATA83,65,86,69,32,80,8
    2,79,71,82,65,77,169,19,133,
    45,1237
50  1050 DATA169,16,133,46,169,0
    ,133,251,169,234,133,252,169
    ,0,133,253,2260
92  1060 DATA169,8,133,254,160,0
    ,177,251,145,253,200,208,249
    ,230,252,230,2919
18  1070 DATA254,165,252,201,243
    ,144,239,96,169,1,133,43,169
    ,8,133,44,2294
6F  1080 DATA162,7,189,71,230,15
    7,0,207,202,16,247,76,0,207,
    120,169,2060
D5  1090 DATA55,133,1,76,113,168
    ,32,232,7,162,0,142,32,208,1
    89,128,1678
C0  1100 DATA230,41,191,157,196,
    5,169,1,157,196,217,232,224,
    14,208,238,2476
46  1110 DATA162,0,189,142,230,4
    1,191,157,16,6,169,1,157,16,
    218,232,1927
71  1120 DATA224,23,208,238,76,1
    65,230,80,82,79,71,82,65,77,
    32,83,1815
```

```
AF  1130 DATA65,86,69,68,46,80,8
    2,69,83,83,32,39,83,80,65,67
    ,1097
7A  1140 DATA69,39,32,70,79,82,3
    2,77,69,78,85,46,32,55,1,76,
    922
74  1150 DATA20,224,169,89,133,2
    51,169,229,133,252,169,167,1
    33,253,169,2,2562
C5  1160 DATA133,254,160,0,177,2
    51,145,253,200,192,85,208,24
    7,96,162,0,2563
78  1170 DATA189,220,230,41,191,
    157,48,6,169,1,157,48,218,23
    2,224,27,2158
7C  1180 DATA208,238,96,80,82,69
    ,83,83,32,82,69,67,79,82,68,
    32,1450
B7  1190 DATA38,32,80,76,65,89,3
    2,79,78,32,84,65,80,69,0,32,
    931
7A  1200 DATA232,7,32,4,231,32,5
    5,1,76,20,224,162,0,189,45,2
    31,1541
03  1210 DATA41,191,157,196,5,16
    9,1,157,196,217,232,224,15,2
    08,238,162,2409
15  1220 DATA0,189,142,230,41,19
    1,157,16,6,169,1,157,16,218,
    232,224,1989
4E  1230 DATA23,208,238,96,80,82
    ,79,71,82,65,77,32,76,79,65,
    68,1421
4F  1240 DATA69,68,46,169,195,13
    3,251,169,231,133,252,169,0,
    133,253,169,2440
F7  1250 DATA4,133,254,160,0,177
    ,251,145,253,200,208,249,230
    ,252,230,254,3000
F4  1260 DATA165,254,201,7,144,2
    39,96,169,224,133,251,169,22
    5,133,252,169,2831
7D  1270 DATA167,133,253,169,2,1
    33,254,160,0,177,251,145,253
    ,200,192,85,2574
BD  1280 DATA208,247,96,162,15,1
    89,136,231,157,232,7,202,16,
    247,96,88,2329
6E  1290 DATA169,55,133,1,169,14
    7,32,210,255,169,53,133,1,12
    0,96,162,1905
DF  1300 DATA32,189,164,231,157,
    55,1,202,16,247,96,88,169,55
    ,133,1,1836
D5  1310 DATA165,197,201,60,208,
    250,169,53,133,1,120,96,169,
    55,133,1,2011
33  1320 DATA76,49,234,169,55,13
    3,1,76,226,252,169,11,141,50
    ,3,169,1814
1D  1330 DATA4,141,51,3,96,72,16
    5,186,201,7,240,4,104,76,237
    ,245,1832
82  1340 DATA165,185,141,41,6,16
    0,15,169,32,153,140,5,136,16
    ,250,164,1778
A5  1350 DATA183,192,17,144,2,16
    0,16,136,48,8,177,187,153,14
    0,5,76,1644
07  1360 DATA45,4,160,71,185,68,
    5,153,188,2,136,16,247,169,1
    ,170,1620
41  1370 DATA168,32,186,255,169,
    158,162,140,160,5,32,189,255
    ,169,0,133,2213
8F  1380 DATA157,169,2,133,252,1
    69,188,133,251,169,251,162,4
    ,160,3,32,2235
A0  1390 DATA216,255,169,131,141
    ,2,3,169,164,141,3,3,169,1,1
    33,157,1857
EC  1400 DATA160,0,162,0,32,203,
    4,165,43,72,32,250,4,165,44,
    72,1408
79  1410 DATA32,250,4,165,45,32,
    250,4,165,46,32,250,4,132,25
    1,164,1826
71  1420 DATA43,169,0,133,43,177
    ,43,32,250,4,200,208,2,230,4
    4,196,1774
7C  1430 DATA45,165,44,229,46,14
    4,238,165,251,32,250,4,32,14
    ,5,169,1833
D9  1440 DATA27,141,17,208,169,5
    5,133,1,88,104,133,44,104,13
    3,43,32,1432
34  1450 DATA132,255,76,50,6,169
    ,6,133,1,169,11,141,17,208,2
    02,208,1784
AA  1460 DATA253,136,208,250,120
    ,169,160,141,4,221,169,0,141
    ,5,221,169,2367
19  1470 DATA25,141,14,221,160,6
    4,169,64,32,250,4,136,208,24
    8,169,90,1995
81  1480 DATA32,250,4,96,133,189
    ,69,251,133,251,169,8,133,16
    3,38,189,2108
35  1490 DATA32,14,5,198,163,208
    ,247,96,162,64,144,2,162,144
    ,142,4,1787
14  1500 DATA221,169,0,141,5,221
    ,169,1,44,13,221,240,251,165
    ,1,73,1935
8F  1510 DATA8,133,1,238,32,208,
    169,25,141,14,221,169,1,44,1
    3,221,1638
D2  1520 DATA240,251,165,1,73,8,
    133,1,169,25,141,14,221,96,1
    73,32,1743
B1  1530 DATA208,133,254,169,164
    ,141,3,3,169,131,141,2,3,32,
    81,3,1637
38  1540 DATA165,254,141,32,208,
    169,55,133,1,88,169,27,141,1
    7,208,32,1840
A3  1550 DATA132,255,165,252,197
    ,251,208,0,32,99,166,173,222
    ,3,240,10,2405
C9  1560 DATA32,142,166,169,0,13
    3,157,76,174,167,108,2,3,162
    ,29,76,1596
98  1570 DATA55,164,139,227,188,
    2,32,32,32,32,32,32,32,32,32
    ,32,1095
2C  1580 DATA32,32,32,32,32,32,3
    2,135,3,32,186,3,168,169,0,1
    33,1053
B9  1590 DATA193,32,186,3,133,19
    4,32,186,3,133,45,32,186,3,1
    33,46,1540
D4  1600 DATA32,186,3,145,193,69
    ,252,133,252,200,208,2,230,1
    94,196,45,2340
6B  1610 DATA165,194,229,46,144,
    234,32,186,3,133,251,96,169,
    7,133,1,2023
89  1620 DATA169,11,141,17,208,2
    02,208,253,136,208,250,120,1
    32,252,140,5,2452
40  1630 DATA221,169,248,141,4,2
    21,162,0,32,200,3,38,189,165
    ,189,201,2183
70  1640 DATA64,208,245,32,186,3
    ,201,64,240,249,201,90,208,2
    34,96,169,2490
27  1650 DATA1,133,189,32,200,3,
    38,189,144,249,165,189,96,16
    9,16,44,1857
B8  1660 DATA13,220,240,251,173,
    13,221,72,169,25,141,14,221,
    104,238,32,2147
75  1670 DATA208,74,96,0,6,230,2
    6,208,2,230,0,0,120,169,53,1
    33,1555
BF  1680 DATA1,76,79,230,0,0,0,0
    ,80,8,0,0,151,53,51,50,779
DD  1690 DATA55,48,44,50,48,48,5
    8,151,53,51,50,56,49,44,48,5
    8,911
DB  1700 DATA151,53,51,50,56,48,
    44,48,58,153,34,147,17,17,17
    ,17,961
45  1710 DATA17,17,17,17,29,29,2
    9,29,29,29,29,5,87,72,65,84,
    584
24  1720 DATA32,68,79,32,89,79,8
    5,32,87,65,78,84,32,84,79,32
    ,1037
04  1730 DATA76,79,65,68,63,34,0
    ,143,8,1,0,151,53,51,50,54,8
    96
57  1740 DATA53,44,57,49,58,151,
    53,51,50,54,57,44,48,58,153,
    34,1014
15  1750 DATA17,5,29,29,29,29,29
    ,29,29,18,32,65,32,146,31,32
    ,581
AE  1760 DATA77,65,67,72,73,78,6
    9,32,67,79,68,69,32,80,82,79
    ,1089
22  1770 DATA71,82,65,77,34,0,18
    0,8,2,0,153,34,17,5,29,29,78
    6
1F  1780 DATA29,29,29,29,29,18,3
    2,66,32,146,31,32,66,65,83,7
    3,789
5C  1790 DATA67,32,80,82,79,71,8
    2,65,77,34,0,220,8,3,0,153,1
    053
78  1800 DATA34,17,5,29,29,29,29
    ,29,29,29,18,32,67,32,146,31
    ,585
E2  1810 DATA32,68,73,83,75,39,8
    3,32,68,73,82,69,67,84,79,82
    ,1089
4A  1820 DATA89,34,0,1,9,5,0,153
    ,34,17,5,29,29,29,29,29,492
2B  1830 DATA29,29,80,82,69,83,8
    3,32,40,65,41,44,40,66,41,32
    ,856
AE  1840 DATA79,82,32,40,67,41,3
    4,0,20,9,6,0,161,65,36,58,73
    0
94  1850 DATA139,65,36,178,34,65
    ,34,167,49,48,0,35,9,7,0,139
    ,1005
C8  1860 DATA65,36,178,34,66,34,
    167,49,48,0,51,9,8,0,139,65,
    949
A0  1870 DATA36,178,34,67,34,167
    ,53,48,52,0,58,9,9,0,137,54,
    936
12  1880 DATA0,125,9,10,0,151,53
    ,51,50,54,53,44,50,55,58,153
    ,916
26  1890 DATA34,147,17,17,17,17,
    17,17,17,17,17,17,17,17,29,2
    9,443
C1  1900 DATA29,29,29,156,76,79,
    65,68,32,70,82,79,77,32,68,7
    3,1044
B3  1910 DATA83,75,32,79,82,32,8
    4,65,80,69,63,32,40,68,47,84
    ,1015
60  1920 DATA41,158,34,0,150,9,2
    0,0,161,68,36,58,139,68,36,1
    78,1156
68  1930 DATA34,68,34,167,68,69,
    178,56,58,137,52,57,0,171,9,
```

```
     30,1188
F1   1940 DATA0,139,68,36,178,34,
     84,34,167,68,69,178,49,58,13
     7,52,1351
97   1950 DATA57,0,179,9,40,0,137
     ,50,48,0,206,9,49,0,151,55,9
     90
96   1960 DATA51,57,44,68,69,58,1
     53,34,147,17,17,17,17,17,17,
     17,800
D7   1970 DATA17,17,17,34,0,235,9
     ,50,0,133,34,17,29,29,29,29,
     679
E8   1980 DATA29,29,29,29,29,70,7
     3,76,69,78,65,77,69,34,59,70
     ,885
8E   1990 DATA36,0,249,9,60,0,139
     ,70,36,178,34,34,167,53,48,0
     ,1113
C7   2000 DATA21,10,70,0,66,178,1
     95,40,70,36,41,58,139,66,177
     ,49,1216
39   2010 DATA54,167,141,57,56,58
     ,156,58,137,53,48,0,64,10,75
     ,0,1134
F6   2020 DATA129,65,178,49,164,6
     6,58,151,55,52,48,170,65,44,
     198,40,1532
97   2030 DATA202,40,70,36,44,65,
     41,41,58,130,58,151,55,52,48
     ,44,1135
F5   2040 DATA66,58,141,55,56,48,
     0,95,10,77,0,139,65,36,178,3
     4,1058
0A   2050 DATA66,34,167,141,49,48
     ,48,58,141,51,48,48,58,141,5
     0,53,1201
71   2060 DATA48,58,137,57,55,0,1
     24,10,80,0,133,34,30,17,29,2
     9,841
29   2070 DATA29,29,29,29,82,85,7
     8,32,65,68,68,82,69,83,83,34
     ,945
03   2080 DATA59,82,0,136,10,81,0
     ,139,82,178,48,167,56,48,0,1
     60,1246
50   2090 DATA10,82,0,139,68,69,1
     78,49,167,141,51,48,48,58,14
     1,50,1299
36   2100 DATA53,48,58,137,57,52,
     0,179,10,83,0,141,51,48,48,5
     8,1023
EB   2110 DATA141,50,53,48,58,141
     ,53,48,48,0,206,10,92,0,151,
     52,1151
B9   2120 DATA51,44,65,68,171,40,
     181,40,65,68,173,50,53,54,41
     ,172,1336
68   2130 DATA50,53,54,41,0,224,1
     0,93,0,151,52,52,44,181,40,6
     5,1110
8C   2140 DATA68,173,50,53,54,41,
     0,238,10,94,0,151,53,57,55,4
     9,1146
C3   2150 DATA50,44,51,50,0,10,11
     ,95,0,151,53,57,55,49,51,44,
     771
61   2160 DATA82,171,40,181,40,82
     ,173,50,53,54,41,172,50,53,5
     4,41,1337
6D   2170 DATA0,30,11,96,0,151,53
     ,57,55,49,52,44,181,40,82,17
     3,1074
47   2180 DATA50,53,54,41,0,45,11
     ,97,0,153,34,147,5,34,58,158
     ,940
F7   2190 DATA54,55,57,0,85,11,98
     ,0,153,34,17,28,29,29,29,29,
     708
44   2200 DATA29,29,29,29,29,70,7
     3,76,69,78,65,77,69,32,84,79
     ,917
B4   2210 DATA79,32,76,79,78,71,3
     3,158,34,58,142,0,123,11,100
     ,0,1074
65   2220 DATA151,53,57,55,49,50,
     44,55,54,58,151,53,57,55,49,
     51,1042
35   2230 DATA44,49,55,52,58,151,
     53,57,55,49,52,44,49,54,55,5
     8,935
37   2240 DATA142,0,144,11,250,0,
     161,83,36,58,139,83,36,179,1
     77,34,1533
B7   2250 DATA32,34,167,50,53,48,
     0,150,11,251,0,142,0,209,11,
     44,1202
AF   2260 DATA1,153,34,147,5,17,1
     7,17,17,17,17,17,17,17,17,17
     ,527
A4   2270 DATA17,29,29,29,80,82,6
     9,83,83,32,39,83,80,65,67,69
     ,936
82   2280 DATA39,32,87,72,69,78,3
     2,82,69,65,68,89,32,84,79,32
     ,1009
0F   2290 DATA76,79,65,68,34,58,1
     42,0,230,11,244,1,159,50,44,
     56,1317
45   2300 DATA44,50,44,70,36,170,
     34,44,80,44,82,34,0,244,11,2
     45,1232
1F   2310 DATA1,161,35,50,44,88,3
     6,44,89,36,0,21,12,246,1,65,
     929
8C   2320 DATA68,178,198,40,88,36
     ,170,199,40,48,41,41,170,50,
     53,54,1474
97   2330 DATA172,198,40,89,36,17
     0,199,40,48,41,41,0,30,12,24
     7,1,1364
06   2340 DATA160,50,58,142,0,90,
     12,248,1,153,34,147,5,17,17,
     17,1151
99   2350 DATA17,17,17,17,17,17,1
     7,17,17,29,29,80,76,69,65,83
     ,584
70   2360 DATA69,32,73,78,83,69,8
     2,84,32,68,73,83,75,32,65,78
     ,1076
C0   2370 DATA68,32,80,82,69,83,8
     3,32,39,83,80,65,67,69,39,34
     ,1005
B8   2380 DATA0,109,12,249,1,141,
     50,53,48,58,151,53,51,50,54,
     53,1133
7B   2390 DATA44,50,55,0,165,12,8
     8,2,134,88,36,40,51,48,41,58
     ,912
E7   2400 DATA89,178,48,58,141,55
     ,52,48,58,159,49,53,44,56,44
     ,49,1181
77   2410 DATA53,44,34,73,34,58,1
     59,51,44,56,44,51,44,34,35,3
     4,848
2D   2420 DATA58,159,50,44,56,44,
     50,44,34,36,34,0,187,12,98,2
     ,908
DA   2430 DATA129,74,178,49,164,5
     0,53,52,58,161,35,50,44,88,3
     6,58,1279
2B   2440 DATA130,0,237,12,108,2,
     129,74,178,49,164,56,58,129,
     75,178,1579
0F   2450 DATA49,164,51,48,58,161
     ,35,50,44,88,36,40,75,41,58,
     130,1128
C0   2460 DATA58,139,88,36,40,49,
     41,179,177,199,40,49,51,48,4
     1,137,1372
77   2470 DATA54,56,48,0,3,13,118
     ,2,129,75,178,52,164,49,57,5
     8,1056
F0   2480 DATA153,88,36,40,75,41,
     59,58,130,0,49,13,128,2,152,
     49,1073
0D   2490 DATA53,44,34,85,49,58,3
     4,59,51,59,48,59,198,40,88,3
     6,995
2E   2500 DATA40,50,41,170,199,40
     ,48,41,41,59,198,40,88,36,40
     ,51,1182
2F   2510 DATA41,170,199,40,48,41
     ,41,0,97,13,138,2,161,35,51,
     44,1121
90   2520 DATA88,36,44,88,36,44,7
     6,36,44,72,36,58,81,178,198,
     40,1155
4D   2530 DATA76,36,170,199,40,48
     ,41,41,170,50,53,54,172,198,
     40,72,1460
E3   2540 DATA36,170,199,40,48,41
     ,41,0,134,13,148,2,139,81,17
     7,50,1319
A1   2550 DATA48,52,57,167,153,34
     ,32,32,34,81,34,32,32,32,32,
     32,884
1E   2560 DATA32,32,32,77,47,67,3
     4,58,137,54,56,48,0,160,13,1
     58,1005
5F   2570 DATA2,153,34,32,32,34,8
     1,34,32,32,32,32,32,32,32,32
     ,658
2F   2580 DATA66,65,83,73,67,34,0
     ,182,13,168,2,139,74,179,56,
     167,1368
03   2590 DATA161,35,50,44,88,36,
     44,88,36,58,130,74,0,202,13,
     178,1237
68   2600 DATA2,89,178,89,170,49,
     58,139,89,179,177,50,167,54,
     50,48,1588
D9   2610 DATA0,242,13,188,2,89,1
     78,48,58,153,34,17,17,29,29,
     29,1126
82   2620 DATA29,29,29,29,29,29,2
     9,29,29,29,80,82,69,83,83,32
     ,719
0D   2630 DATA39,83,80,65,67,69,3
     9,34,0,7,14,198,2,161,65,36,
     959
D2   2640 DATA58,139,65,36,179,17
     7,34,32,34,167,55,49,48,0,27
     ,14,1114
02   2650 DATA208,2,139,83,84,178
     ,48,167,141,55,52,48,58,137,
     54,50,1504
9C   2660 DATA48,0,43,14,218,2,16
     0,50,58,160,51,58,160,49,53,
     58,1182
B4   2670 DATA138,0,85,14,228,2,1
     53,34,147,152,29,29,29,29,29
     ,29,1127
7C   2680 DATA29,29,71,89,82,79,8
     3,80,69,69,68,32,68,73,83,75
     ,1079
3D   2690 DATA32,68,73,82,69,67,8
     4,79,82,89,34,0,125,14,238,2
     ,1138
F5   2700 DATA153,34,29,29,29,29,
     29,29,29,29,163,163,163,163,
     163,163,1397
AB   2710 DATA163,163,163,163,163
     ,163,163,163,163,163,163,163
     ,163,163,163,163,2608
23   2720 DATA163,163,34,0,172,14
     ,248,2,153,34,29,29,70,73,76
     ,69,1329
26   2730 DATA78,65,77,69,32,32,3
     2,32,32,32,32,83,84,65,82,84
```

```
    ,911
BC  2740 DATA32,65,68,68,82,32,3
    2,32,32,70,73,76,69,84,89,80
    ,984
6C  2750 DATA69,34,0,223,14,2,3,
    153,34,29,29,163,163,163,163
    ,163,1405
35  2760 DATA163,163,163,32,32,3
    2,32,32,32,32,163,163,163,16
    3,163,163,1691
E9  2770 DATA163,163,163,163,32,
    32,32,32,163,163,163,163,163
    ,163,163,163,2084
29  2780 DATA17,151,34,58,142,0,
    23,15,12,3,153,34,147,155,17
    ,17,978
1F  2790 DATA17,17,17,17,17,17,1
    7,17,17,29,29,29,29,73,83,32
    ,457
92  2800 DATA84,72,69,32,70,73,7
    6,69,78,65,77,69,32,84,79,32
    ,1061
41  2810 DATA66,69,32,68,73,70,7
    0,69,82,69,78,84,34,0,63,15,
    942
67  2820 DATA13,3,153,34,17,29,2
    9,29,29,29,29,29,29,70,79,82
    ,683
26  2830 DATA32,84,85,82,66,79,3
    2,86,69,82,83,73,79,78,32,40
    ,1082
CA  2840 DATA89,47,78,41,34,0,83
    ,15,14,3,161,75,36,58,139,75
    ,948
F6  2850 DATA36,178,34,89,34,167
    ,55,56,54,0,99,15,15,3,139,7
    5,1049
25  2860 DATA36,178,34,78,34,167
    ,55,56,53,0,108,15,16,3,137,
    55,1025
28  2870 DATA56,50,0,146,15,17,3
    ,129,65,178,49,164,66,58,151
    ,51,1198
92  2880 DATA52,53,170,65,44,194
    ,40,55,52,48,170,65,41,58,13
    0,58,1295
21  2890 DATA151,51,52,53,44,66,
    58,142,0,189,15,18,3,133,34,
    147,1156
4F  2900 DATA17,17,17,17,17,17,1
    7,17,17,17,17,29,29,69,78,84
    ,476
FE  2910 DATA69,82,32,78,69,87,3
    2,70,73,76,69,78,65,77,69,34
    ,1060
B4  2920 DATA59,90,36,0,204,15,1
    9,3,139,90,36,178,34,34,167,
    55,1159
9E  2930 DATA56,54,0,233,15,20,3
    ,66,178,195,40,90,36,41,58,1
    39,1224
8E  2940 DATA66,177,49,54,167,14
    1,57,56,58,156,58,137,55,56,
    54,0,1341
B1  2950 DATA17,16,21,3,129,65,1
    78,49,164,66,58,151,51,52,53
    ,170,1243
54  2960 DATA65,44,198,40,202,40
    ,90,36,44,65,41,41,58,130,58
    ,151,1303
68  2970 DATA51,52,53,44,66,58,1
    42,0,0,0,255,255,255,255,255
    ,255,1996
FC  2980 DATA255,255,255,255,255
    ,255,255,66,90,0,0,0,0,0,0,9
    1,2032
61  2990 DATA0,0,0,66,123,82,0,0
    ,0,82,0,0,0,0,0,0,353
1B  3000 DATA0,0,91,66,0,0,0,126
    ,102,126,102,102,102,96,102,
    102,1117
4C  3010 DATA110,126,126,102,24,
    120,102,24,108,126,24,102,0,
    0,0,0,1094
84  3020 DATA0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
92  3030 DATA0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
E8  3040 DATA0,0,0,0,0,0,126,1
    26,126,102,102,102,102,96,10
    2,984
80  3050 DATA102,126,126,102,6,9
    6,102,102,96,126,126,96,0,0,
    0,0,1206
AC  3060 DATA0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
BA  3070 DATA0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
8F  3080 DATA0,0,0,0,0,0,126,1
    26,124,96,96,102,96,96,102,9
    64
CD  3090 DATA120,120,102,96,96,1
    02,96,96,102,126,126,124,0,0
    ,0,0,1306
DB  3100 DATA0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
E1  3110 DATA0,0,0,0,0,0,0,0,0
    ,0,0,0,0,0,0,0
A0  3120 DATA0,0,0,0,0,0,255,2
    55,77,0,255,255,255,255,255,
    1862
40  3130 REM **** READY TO SAVE
    ****
9D  3140 PRINT"[DOWN4]PRESS ANY
    KEY TO SAVE"
C4  3150 GETK$:IFK$=""THEN3150
C4  3160 POKE43,1:POKE44,8:POKE4
    5,77:POKE46,27
F7  3170 SAVE"GYROSPEED",8,1
09  3180 REM CHANGE ,8,1 IN ABOV
    E LINE TO ,1,1 FOR TAPE USE
```

MODEM REVEALED



PROGRAM: U-U AUTO DIAL

```
53  10 POKE56832,3:POKE56833,32
4B  20 POKE53280,15:POKE53281,15
    :PRINT"[CLR,C8]USER TO USER
    TERMINAL":IFPP=-1THEN60
98  30 PRINT"[DOWN]AUTODIAL NUMB
    ER? (Y/N)"
34  40 GETA$:IFA$<>"Y"ANDA$<>"N"
    THEN40
28  50 IFA$="Y"THEN350
D4  60 PRINT"[DOWN]WILL YOU [RVS
    ON]SEND[RVSOFF] OR [RVSON]RE
    CEIVE[RVSOFF] FIRST?"
0C  70 GETA$
BE  80 IFA$="S"THENGOSUB110:GOTO
    220
14  90 IFA$<>"R"THEN70
25  100 GOSUB150:GOTO290
12  110 PRINT"[CLR]PREPARE, THEN
     KEY [CTRL]"
41  120 WAIT653,4:WAIT653,4,4:PR
    INT"[CLR]PLEASE WAIT..."
5F  130 POKE56832,6:POKE56833,0:
    FORX=1TO1000:POKE56832,4:POK
    E56833,192:NEXT
02  140 RETURN
6A  150 PRINT"[CLR]PREPARE, THEN
     KEY [CTRL]"
73  160 POKE56832,6:POKE56833,0
D1  170 WAIT653,4:WAIT653,4,4:PR
    INT"[CLR]PLEASE WAIT - CARRI
    ER SCAN"
75  180 FORX=1TO1200:POKE56832,4
    :IFPEEK(56833)=0ANDX<1000THE
    NNEXT
35  190 POKE56832,4:IFPEEK(56833
    )=0ANDX>1000THENPRINT"[DOWN,
    RVSON]NO CARRIER...[RVSOFF]
    LINE DROPPED":Z=-1
4C  200 IFZ<>-1THENNEXT:RETURN
5E  210 Z=0:POKE56832,3:POKE5683
    3,32:FORX=1TO1000:NEXT:RUN
27  220 PRINT"[DOWN3,C8]SEND MOD
    E... F3 TO RECEIVE"
5A  230 GETA$:IFA$=""THEN230
A5  240 IFA$="[F3]"THENA$="[F1]"
05  250 POKE56832,4:POKE56833,AS
    C(A$)
70  260 IFA$="[F1]"THENPRINT:GOT
    O290
AC  270 IFA$="[F7]"THENPRINT:GOT
    O330
86  280 PRINTA$"←[LEFT]";:GOTO23
    0
62  290 PRINT"[DOWN3,C8]RECEIVE
    MODE... F1 TO SEND"
83  300 POKE56832,4:A=PEEK(56833
    ):IFA=0THEN300
E9  310 A$=CHR$(A):IFA$="[F1]"TH
    ENPRINT:GOTO220
9A  320 PRINTA$"←[LEFT]";:GOTO30
    0
DA  330 PRINT"[CLR]DROPPING LINE
    ...":POKE56832,3:POKE56833,3
    2:PRINT"[DOWN2]DROPPED..."
54  340 FORX=1TO1000:NEXT:RUN
5B  350 PRINT"[CLR,C4]AUTODIALLE
    R":POKE53280,15:POKE53281,15
8D  360 INPUT"[DOWN]DIAL A NUMBE
    R BY NAME (Y/N)[RIGHT3]Y[LEF
    T3]";A$:IFA$<>"Y"ANDA$<>"N"T
    HENRUN
C7  370 IFA$="N"THENINPUT"[DOWN]
    NUMBER TO DIAL";PH$:GOTO430
6F  380 INPUT"[DOWN]NAME TO SEAR
    CH FOR";N$
0B  390 RESTORE
C8  400 READA$,PH$:IFA$="END"AND
    PH$="END"THENPRINT"[DOWN]SOR
    RY, NO ENTRY FOR "N$:ZZ=-1
AC  410 IFZZ=-1THENFORX=1TO1000:
    NEXT:RUN
B4  420 IFA$<>N$THEN400
1E  430 POKE56832,6:POKE56833,0
88  440 FORX=1TO1000:NEXTX
93  450 POKE56832,6:POKE56833,1
74  460 FORX=1TO1000:NEXTX
78  470 PRINT"[CLR,DOWN2]DIALLIN
    G NUMBER[DOWN]":PRINT"[C5]"P
    H$"[UP,C8]"
16  480 FORT=1TOLEN(PH$):NM$=MID
    $(PH$,T,1)
B2  490 N$=NM$:PRINTN$;
2A  500 IFNM$="0"THENNM$=":":N$=
    "10"
ED  510 POKE56832,8:POKE56833,AS
```

```
   C(NM$):POKE56832,8
D5  520 IFPEEK(56833)<>VAL(N$)TH
    EN520
EA  530 NEXTT
C9  550 PP=-1:GOTO20
E9  560 DATA"EMERGENCY","999"
FE  570 DATA"TIME-LINE","8081"
05  580 DATA"END","END"
A1  590 REM ↑↑↑↑↑↑↑↑↑↑↑
19  600 REM ENSURE THAT YOUR LAS
    T DATA
63  610 REM LINE HAS THE ABOVE E
    NTRIES
25  620 REM IN IT, OR THE PROGRA
    M WILL
84  630 REM GIVE THE OUT OF DATA
    ERROR
25  640 REM ERROR MESSAGE IF A N
    AME IS
BB  650 REM NOT FOUND IN THE DAT
    ABASE.
```

CLEAR WITH BASIC

PROGRAM: LISTING 1

```
0 REM **************************
*******
1 REM *  CLEAR WITH BASIC/N.HIGGI
NS 87 *
2 REM **************************
*******
3 REM *   -  LISTING 1 BASE MODUL
E  -  *
4 REM *   WHEN ENTERING LISTING'S
 2-8  *
5 REM *   JUST TYPE OVER LINES 10
0 +    *
6 REM **************************
*******
20 DATA"HIT A KEY TO SEE SCREEN
CLEAR IN ACTION!"
30 POKE53280,0:POKE53281,0
40 PRINTCHR$(147);
50 READA$:FORT=0TO23
60 PRINTA$;:NEXT
70 FORT=55296TO56296:POKET,INT(R
ND(0)*15)+1:NEXT
80 POKE198,0:WAIT198,1
90 REM ***** MAIN ROUTINES HERE
*****
100 A$="                        "+
CHR$(19)
110 FORI=0TO12:PRINTA$;:POKE781,
I:SYS59903
120 PRINTA$;:POKE781,24-I:SYS599
03:NEXT:SYS58692
```

PROGRAM: LISTING 2

```
110 A$="                        "+
CHR$(19):B=12
130 FORA=11TO0STEP-1:PRINTA$;:PO
KE781,A:SYS59903
140 PRINTA$;:POKE781,B:SYS59903:
B=B+1:NEXT:SYS58692
```

PROGRAM: LISTING 3

```
100 D$="          "
110 FORI=24TO0STEP-1:POKE214,I:P
OKE211,0:SYS58732:PRINTD$;:NEXT
120 FORI=0TO24:POKE211,10:POKE21
4,I:SYS58732:PRINTD$;:NEXT
130 FORI=24TO0STEP-1:POKE211,20:
POKE214,I:SYS58732:PRINTD$;:NEXT
140 FORI=0TO24:POKE211,30:POKE21
4,I:SYS58732:PRINTD$;:NEXT
150 PRINTCHR$(19)
```

PROGRAM: LISTING 4

```
110 D$="                    "
120 FORI=11TO0STEP-1:POKE211,20:
POKE214,I:SYS58732:PRINTD$;:NEXT
130 FORI=12TO24:POKE211,0:POKE21
4,I:SYS58732:PRINTD$;:NEXT
140 FORI=11TO0STEP-1:POKE211,0:P
OKE214,I:SYS58732:PRINTD$;:NEXT
150 FORI=12TO24:POKE211,20:POKE2
14,I:SYS58732:PRINTD$;:NEXT
160 PRINTCHR$(19)
```

PROGRAM: LISTING 5

```
100 A$="              ":C=24
110 FORI=0TO24:POKE211,0:POKE214
,I:SYS58732:PRINTA$;
120 POKE211,26:POKE214,I:SYS5873
2:PRINTA$;
130 POKE211,14:POKE214,C:SYS5873
2:PRINTA$;:C=C-1:NEXT
140 PRINTCHR$(19)
```

PROGRAM: LISTING 6

```
100 A$=CHR$(19):B$=" ":C$=B$
110 FORI=1TO23:C$=C$+CHR$(157)+C
HR$(17)+B$:NEXT:C$=C$+A$
120 FORI=0TO24:PRINTA$;TAB(I)C$:
POKE781,I:SYS59903:NEXT
```

PROGRAM: LISTING 7

```
100 B$=" ":C$=B$:A$=CHR$(19)
110 FORI=1TO23:C$=C$+CHR$(157)+C
HR$(17)+B$:NEXT:C$=C$+A$
120 FORI=0TO12:PRINTA$;TAB(I)C$:
POKE781,I:SYS59903
130 PRINTA$;TAB(39-I)C$:POKE781,
24-I:SYS59903:NEXT:PRINTA$
```

PROGRAM: LISTING 8

```
100 FORL=0TO7:CX=0:FORD=0TO15:RE
ADA:CX=CX+A:POKE49152+L*16+D,A:N
EXTD
110 READA:IFA<>CXTHENPRINT"ERROR
 IN LINE";130+(L*10):STOP
120 NEXTL:SYS49152
130 DATA162,0,134,251,202,134,25
4,162,24,142,116,192,174,116,192
,134,2389
140 DATA252,162,1,134,253,165,25
2,10,10,101,252,10,10,38,253,10,
1913
150 DATA38,253,133,252,164,251,1
69,32,145,252,32,70,192,206,116,
192,2497
160 DATA16,218,230,254,164,254,1
85,76,192,240,5,133,251,76,7,192
,2493
170 DATA169,19,32,210,255,96,160
,220,136,208,253,96,39,1,38,2,19
34
180 DATA37,3,36,4,35,5,34,6,33,7
,32,8,31,9,30,10,320
190 DATA29,11,28,12,27,13,26,14,
25,15,24,16,23,17,22,18,320
200 DATA21,19,20,0,24,170,1,170,
161,232,161,254,161,190,241,169,
1994
210 REM
220 REM * POKE 49223,(1-255) FOR
 SPEED *
```

TABULATE

PROGRAM: TABULATE

```
78  59860 REM                 ******
    ***********
48  59870 REM                 *
              *
22  59880 REM                 * TABU
    LATE V1.3 *
54  59890 REM                 *
              *
C7  59900 REM                 *   D.
    J.TRIPP   *
3F  59910 REM                 *
              *
AA  59920 REM                 *     1
    2/10/87   *
8B  59930 REM                 *
              *
EB  59940 REM                 ******
    ***********
22  59950 :
18  59960 :
16  59970 :
6F  59980 REM --> ENTRY (1) - -
    GOSUB 60000- 'INITIALISE, DE
    FAULT VALUES' - - - - -
7A  59990 :
7C  60000 CO=20               :REM
       (CO)LUMN WIDTH
81  60010 TY=ASC("S")         :REM
       (TY)PE
```

```
86   60020 PL=3                    :REM
       DECIMAL (PL)ACES
AF   60030 JU=ASC("C")             :REM
       (JU)STIFICATION
EA   60040 SI=3                    :REM
       (SI)ZE EXPECTED FOR ROUND
     ED NUMBERS
91   60050 SP$="[SPC66]"
0C   60060 PZ=INT(10↑PL+.5):RETUR
     N
AA   60070 :
A0   60080 :
9E   60090 :
03   60980 REM --> ENTRY (2) - -
     GOSUB 61000= 'READ FM$' - -
     - - - - - - - - - - - -
16   60990 :
84   61000 IF FM$="" THEN 61160
               :REM      ALL DEF
     AULT VALUES
14   61010 IF ASC(FM$)>=ASC("A")
     THEN 61060 :REM      DEFAULT
      CO
5B   61020 PX$=""
               :REM      PULL CO
      DIGITS OFF, AS IF NEXT
D8   61030 PX$=PX$+LEFT$(FM$,1):G
     OSUB 61200 :REM      IS "E"
     THEN ERROR IN CO!
5E   61040 IF FM$<>"" THENIF ASC(
     FM$)<ASC("A") THEN 61030
22   61050 CO=VAL(PX$):IF FM$=""
     THEN 61160 :REM      READ CO

75   61060 TY=ASC(FM$)
               :REM      READ TY

A9   61070 GOSUB 61200:IF FM$=""
     THEN 61160 :REM      DEFAULT
      PL
33   61080 IF ASC(FM$)>=ASC("A")
     THEN 61140 :REM      DEFAULT
      PL
13   61090 PX$=""
               :REM      PULL PL
      DIGITS OFF, AS IF NEXT
0E   61100 PX$=PX$+LEFT$(FM$,1):G
     OSUB 61200 :REM      IS "E"
     THEN ERROR IN PL!
6B   61110 IF FM$<>"" THEN IF ASC
     (FM$)<ASC("A") THEN 61000
B2   61120 PL=VAL(PX$):IF FM$=""
     THEN 61160 :REM      READ CO

AA   61130 PZ=INT(10↑PL+.5)
               :REM      ROUNDIN
     G FACTOR
83   61140 JU=ASC(FM$):GOSUB 6120
     0         :REM      READ JU

CB   61150 IF FM$<>"" THEN SI=VAL
     (FM$)      :REM      READ SI

1F   61160 FM$="":RETURN
DA   61170 :
C0   61180 REM - - - - - - - - - -
     GOSUB 61200= 'STRIP ONE CHAR
     ACTER'- - - - - - - - -
CF   61190 :
C9   61200 IF FM$<>"" THEN FM$=RI
     GHT$(FM$,LEN(FM$)-1)
87   61210 RETURN
29   61220 :
27   61230 :
1D   61240 :
AD   61980 REM --> ENTRY (3) - -
     GOSUB 62000= 'FORMAT AND PRI
     NT PE$/PX - - - - - - -
22   61990 :
04   62000 IF PE$<>"" THEN PX$=LE
     FT$(PE$,CO):GOTO 62340:REM
         TYPE 'STRINGS'
83   62010 IF TY=ASC("S") OR ABS(
     PX)>999999999 THEN DV=10:GOT
     O 62090
9E   62020 IF TY=ASC("E") THEN DV
     =1000:GOTO 62090
63   62030 IF TY=ASC("R") OR TY=A
     SC("M") THEN 62190
85   62040 IF TY=ASC("M") THEN 62
     190
70   62050 PX$=STR$(PX):PE$=PX$:G
     OTO 62340
64   62060 :
FA   62070 REM - - - - - - - - - -
     GOTO 62090= 'TYPE "S"&"E" FO
     RMATS'- - - - - - - - -
48   62080 :
89   62090 IF PX=0 THEN VE=0:GOTO
      62120
8B   62100 VE=INT(LOG(ABS(PX))/LO
     G(DV)):IF TY=ASC("E") THEN V
     E=VE*3
6C   62110 PX=PX/(10↑VE)
F0   62120 GOSUB 62460:GOSUB 6258
     0:PX$=STR$(PX):GOSUB 62500
8B   62130 PX$=PX$+" E":IF VE<0 T
     HEN PX$=PX$+"-":GOTO 62150
F9   62140 PX$=PX$+"+"
2E   62150 PX$=PX$+RIGHT$(STR$(VE
     ),LEN(STR$(VE))-1):GOTO 6234
     0
F8   62160 :
65   62170 REM - - - - - - - - - -
     GOTO 62190= 'TYPE "R" & "M"
     FORMATS'- - - - - - - -
EC   62180 :
F5   62190 GOSUB 62460:IF (PL=0)
     OR (ABS(PX)>=1) THEN 62230
A0   62200 PX$=STR$(INT(PX*PZ+.5)
     ):PX$=RIGHT$(PX$,LEN(PX$)-1)

0C   62210 IF LEN(PX$)<PL THEN PX
     $="0"+PX$:GOTO 62210
03   62220 PX$=LEFT$(STR$(SGN(PX)
     ),1)+"0."+PX$:DL=2:GOTO 6234
     0
7A   62230 PX$=STR$(PX)
69   62240 GOSUB 62580:GOSUB 6250
     0
48   62250 IF TY=ASC("R") THEN 62
     340
D1   62260 PE$=RIGHT$(PX$,PL+1):P
     X$=LEFT$(PX$,LEN(PX$)-PL-1)
69   62270 FOR VE=4 TO 16 STEP 4
E4   62280 IF LEN(PX$)>VE THEN PX
     $=LEFT$(PX$,LEN(PX$)-VE+1)+"
     ,"+RIGHT$(PX$,VE-1)
C7   62290 NEXT
E5   62300 DL=LEN(PX$):PX$=PX$+PE
     $:PE$=""
63   62310 :
3F   62320 REM - - - - - - - - - -
     GOSUB 62340= 'JUSTIFY & PRIN
     T'- - - - - - - - - - -
57   62330 :
C8   62340 IF JU=ASC("L") THEN PX
     $=LEFT$(PX$+SP$,CO):GOTO 624
     20
A7   62350 IF JU=ASC("R") THEN PX
     $=RIGHT$(SP$+PX$,CO):GOTO 62
     420
52   62360 IF PE$<>"" THEN DD=(CO
     -LEN(PX$))/2:GOTO 62390
A1   62370 IF TY=ASC("R") OR TY=A
     SC("M") THEN DD=(CO-PL+SI)/2
     -DL:GOTO 62390
69   62380 DD=(CO-PL)/2-DL-2:IF T
     Y=ASC("E") THEN DD=DD+1
      :REM "S"&"E" OFFSETS
CD   62390 IF DD+LEN(PX$)>CO THEN
      DD=DD-1: GOTO 62390
90   62400 IF DD<0 THENDD=0
2D   62410 PX$=LEFT$(SP$,DD)+PX$:
     PX$=LEFT$(PX$+SP$,CO)
DE   62420 PRINT PX$;:PX$="":PE$=
     "":PX=0:RETURN
EB   62430 :
B2   62440 REM - - - - - - - - - -
     GOSUB 62460= 'FORM INTEGER'
     - - - - - - - - - - - - -
DF   62450 :
F1   62460 PX=INT(PZ*ABS(PX)+.5)/
     PZ*SGN(PX):RETURN
C0   62470 :
57   62480 REM - - - - - - - - - -
     GOSUB 62500= 'ADD TRAILING Z
     EROS' - - - - - - - - -
34   62490 :
69   62500 IF PL=0 THEN 62540
30   62510 IF LEN(PX$)=DL THEN PX
     $=PX$+"."
DD   62520 IF LEN(PX$)<(DL+PL+1)
     THEN PX$=PX$+"0":GOTO 62520
2F   62530 IF LEN(PX$)>(DL+PL+1)
     THEN PX$=LEFT$(PX$,DL+PL+1)
CE   62540 RETURN
70   62550 :
DD   62560 REM - - - - - - - - - -
     GOSUB 62580= 'LENGTH AHEAD O
     F DECIMAL POINT'- - - -
64   62570 :
00   62580 DL=LEN(STR$(INT(ABS(PX
     )))):RETURN
48   62590 :
46   62600 :
BC   62610 :
25   62980 REM --> ENTRY (4) - -
     GOSUB 63000= 'REFORMAT,& PRI
     NT PE$/PX - - - - - - -
3E   62990 :
51   63000 GOSUB 61000:GOTO 62000
```

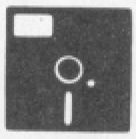
PROGRAM: DEMO

```
57   10 REM                      DEM
     O FOR "TABULATE"
1F   20 REM                      D.J
     .TRIPP   5/10/87
24   30 :
97   40 S$=":"
B2   50 L$="-------------------------
     ---------------------------------
     ----------------------"
06   60 :
7A   70 DEF FNV(X)=3.14159265*X*X
     *25          :REM VOLUME
81   80 DEF FNC(X)=FNV(X)*.23+5
                  :REM PRICE
60   90 :
67   100 :
                  :REM SET UP HEADE
     R DATA
66   110 READ CH$:FOR I=1 TO 3:FO
     R J=1 TO 3:READ H$(I,J):NEXT
     :NEXT
42   120 :
69   130 DATA PER METRE
AB   140 DATA DIAM,VOLUME,"PRICE,
     £"
47   150 DATA (CM),(CU. CM),(INC.
      HANDLING)
F9   160 DATA 6R0D2,12R0D6,15M2D4

90   170 :
C8   180 READ MA
```

```
                 :REM MA = MARGIN
     TO LEFT OF TABLE
84   190 :
7D   200 DATA  2
E8   210 :
65   220 GOSUB 60000
                 :REM SET DEFAULTS
     AND DEFINE SP$,PZ
DC   230 :
48   240 Q$="N":INPUT"PRINTOUT RE
     QUIRED";Q$:IF ASC(Q$)=ASC("Y
     ") THEN OPEN4,4:CMD4
C0   250 :
3A   260 :
                 :REM CALCULATE LIN
     E LENGTHS FROM FM$ DATA
1F   270 S1=VAL(H$(3,1)):S2=1:FOR
      I=2 TO 3:FM$=H$(3,I):GOSUB6
     1000:S2=S2+CO
07   280 NEXT:S3=S1+S2+1
19   290 :
38   300 :
                 :REM PRINT HEADER
A8   310 PRINT SPC(MA+1);:CO=S3:P
     E$=L$:GOSUB 62000:PRINT
      :REM TOP LINE
67   320 PRINT SPC(MA)S$;:CO=S1:P
     E$=" ":GOSUB 62000:PRINT S$;
      :REM BLANK FIELD
16   330 PE$=CH$:CO=S2:GOSUB62000
     :PRINTS$
      :REM FIRST HEADING
43   340 PRINT SPC(MA)S$;:CO=S1:P
     E$=" ":GOSUB 62000:PRINT S$;
      :REM BLANK FIELD
91   350 PE$=L$:CO=S2:GOSUB 62000
     :PRINT S$
      :REM MID LINE
7B   360 FOR I=1 TO 2:PRINT SPC(M
     A)S$;:FOR J=1 TO 3
      :
43   370 FM$=H$(3,J):PE$=H$(I,J):
     GOSUB 63000:PRINT S$;
      : REM REST OF HEADINGS
92   380 NEXT:PRINT:NEXT
      :
4A   390 PRINT SPC(MA)S$;:CO=S3:P
     E$=L$:GOSUB 62000:PRINT S$
      :REM UNDERLINE
AB   400 :
F8   410 :
                 :REM CALCULATIONS
D4   420 FOR I= -2 TO 2:PRINT SPC
     (MA)S$;
      :
D8   430 :  DIAMETER = 10↑I
      :
86   440 :  CASH = FNC(DIAMETER)
      :
08   450 :  VOLUME = FNV(DIAMETER
     )
      :
99   460 :  PX=DIAMETER:FM$=H$(3,
     1):GOSUB 63000:PRINT S$;
      :
21   470 :  PX=VOLUME:FM$=H$(3,2)
     :GOSUB 63000:PRINT S$;
      : REM DATA PRINTOUT
46   480 :  PX=CASH:FM$=H$(3,3):G
     OSUB 63000:PRINT S$
      :
69   490 NEXT
F7   500 PRINT SPC(MA+1);:CO=S3:P
     E$=L$:GOSUB 62000:PRINT
      :REM END OF TABLE LINE
C5   510 :
14   520 PRINT"PRINTOUT WITH DATA
     LINES:-"
9D   530 PRINT"160 DATA ";:FOR I=
     1 TO 2:PRINT H$(3,I)",";:NEX
     T:PRINT H$(3,3)
BB   540 PRINT"200 DATA "MA
D6   550 IF ASC(Q$)=ASC("Y") THEN
      PRINT#4:CLOSE4:END
66   560 PRINT"RUN":END
06   570 :
7C   580 :
6A   590 :
```

MAKING GEOS BRITISH



PROGRAM: BSW UK

```
4C   5 POKE53280,0:POKE53281,0:PR
     INT CHR$(31);CHR$(147)
EF   10 PRINT"  *****************
     ******************"
8D   20 PRINT"  **[SPC32]**"
78   30 PRINT"  **  PRODUCED FOR
     YOUR COMMODORE.  **"
FE   40 PRINT"  **[SPC7]BY BRIAN
     SEDGEBEAR[SPC7]**"
87   50 PRINT"  **[SPC32]**"
85   60 PRINT"  *****************
     ******************"
D2   70 FOR Q=0 TO 500:NEXTQ
36   80 PRINT CHR$(147);:REM CLEA
     R SCREEN
39   90 OPEN 1,8,15,"I":GOSUB 430
08   100 OPEN 2,8,2,"GEOS KERNAL"
     :GOSUB 430
05   110 GET#2,A$,A$,T$,S$:GOSUB
     430:CLOSE 2
11   120 OPEN 3,8,3,"#1" : GOSUB
     430
C5   130 FOR Z=0 TO 17
20   140 PRINT#1,"U1:"3;0;ASC(T$)
     ;ASC(S$)
61   150 PRINT "SEARCHING GEOS":X
     $=T$:Y$=S$
7C   160 PRINT CHR$(145);
70   170 PRINT#1,"B-P:"3;0
D6   180 GET#3,T$,S$:S$=S$+CHR$(0
     )
8D   190 IF Z<17 THEN NEXT Z
2E   200 RESTORE:C=0:BYTE=252
64   210 READ D:IF K=254 THEN K=0
     :GOTO 140
3A   220 GET#3,A$:A=ASC(A$+CHR$(0
     )):K=K+1
B5   230 IF A<>D THEN I=0:GOTO 20
     0
AA   240 I=I+1:IF I<4 THEN 210
FA   250 PRINT#1,"B-P:"3;BYTE
E6   260 READ D
E0   270 PRINT#3,CHR$(D)
DF   280 C=C+1:IF C=7 THEN 300
84   290 BYTE=BYTE+60:IF BYTE <25
     6 THEN 250
8A   300 PRINT#1,"U2:"3;0;ASC(X$)
     ;ASC(Y$)
99   310 IF C=7 THEN 370
2F   320 BYTE=BYTE-254
F5   330 PRINT#1,"U1:"3;0;ASC(T$)
     ;ASC(S$)
CC   340 PRINT "INSTALLING STERLI
     NG SIGN":X$=T$:Y$=S$
8A   350 PRINT CHR$(17):PRINT#1,"
     B-P:"3;0:GET#3,T$,S$
57   360 GOTO 250
4B   370 CLOSE 3:CLOSE 1
D9   380 PRINT "BSW STERLING INST
     ALLED";CHR$(17)
A5   390 PRINT "WOULD YOU LIKE ME
      TO BOOT GEOS";
9C   400 GETM$:IF M$="" THEN 400
1F   410 IF M$<>"Y"THEN END
ED   420 LOAD"GEOS",8,1
2D   430 INPUT#1,A,B$:IF A THEN P
     RINT B$:STOP
37   440 RETURN
66   450 DATA 208,1,219,1,6,137,1
     36,94,72,136,159
```

PROGRAM: GEODEX UK

```
06   10 POKE 53280,0:POKE53281,0:
     PRINT CHR$(147):CHR$(31);
8D   20 PRINT"  *****************
     ******************"
3B   30 PRINT"  **[SPC10]GEODEX U
     K[SPC13]**"
14   40 PRINT"  **  PRODUCED FOR
     YOUR COOMODORE.  **"
B4   50 PRINT"  **[SPC7]BY BRIAN
     SEDGEBEAR[SPC7]**"
85   60 PRINT"  **[SPC32]**"
8B   70 PRINT"  *****************
     ******************"
F0   80 FORT=0TO1000:NEXTT
94   90 PRINT CHR$(147);
59   100 PRINT TAB(17) "TRACING"
66   110 OPEN 1,8,15,"I":GOSUB 84
     0
B6   120 OPEN 3,8,3,"#1":GOSUB 84
     0
53   130 PRINT#1,"U1:"3;0;18;1
FE   140 PRINT#1,"B-P:"3;0
60   150 GET#3,T$,S$:S$=S$+CHR$(0
     )
2C   160 RESTORE
7B   170 READ D:IF K=254 THEN K=0
     :GOTO 130
02   180 GET#3,A$:A=ASC(A$+CHR$(0
     )):K=K+1
6A   190 IF A<>D THEN I=0:GOTO 16
     0
35   200 I=I+1:IF I<8 THEN 170
93   210 K=K-8
09   220 PRINT#1,"B-P:"3;K
D0   230 GET#3,T$,S$:S$=S$+CHR$(0
     )
D1   240 FOR Z=0 TO 8
52   250 PRINT#1,"U1:"3;0;ASC(T$)
     ;ASC(S$)
B5   260 PRINT#1,"B-P:"3;0:PRINT
     TAB(12) "SEARCHING  GEODEX"
97   270 PRINTCHR$(145);CHR$(145)
FD   280 X$=T$:Y$=S$
A5   290 GET#3,T$,S$:S$=S$+CHR$(0
     )
A8   300 IF Z<8 THEN NEXT Z
D0   310 RESTORE :FOR Z=0 TO 7:RE
     AD D:NEXT Z
E3   320 READ D:IF K=254 THEN K=0
     :GOTO 250
```

```
29   330 GET#3,A$:A=ASC(A$+CHR$(0
     )):K=K+1
8A   340 IF A<>D THEN I=0:GOTO 31
     0
C7   350 I=I+1:IF I<8 THEN 320
B0   360 READ L,B:IF L=255 THEN 4
     00
E0   370 PRINT#1,"B-P:"3,L
77   380 PRINT#3,CHR$(B);
63   390 GOTO 360
5E   400 PRINT#1,"U2:"3;0;ASC(X$)
     ;ASC(Y$)
34   410 PRINT:PRINT:PRINT TAB(10
     ) "NOW CONVERTING GEODEX"
B3   420 PRINT#1,"U1:"3;0;ASC(T$)
     ;ASC(S$)
A7   430 PRINT#1,"B-P:"3;0
1D   440 X$=T$:Y$=S$
BF   450 GET#3,T$,S$:S$=S$+CHR$(0
     ):
05   460 READ L,B:IF L=255 THEN 5
     00
5B   470 PRINT#1,"B-P:"3;L
D3   480 PRINT#3,CHR$(B);
DC   490 GOTO 460
62   500 PRINT#1,"U2:"3;0;ASC(X$)
     ;ASC(Y$)
08   510 FOR Z=0 TO 15
C2   520 PRINT#1,"U1:"3;0;ASC(T$)
     ;ASC(S$)
1A   530 X$=T$:Y$=S$
2C   540 PRINT#1,"B-P:"3;0
B8   550 GET#3,T$,S$:S$=S$+CHR$(0
     ):
8A   560 NEXT Z
F6   570 READ L,B:IF L=255 THEN 6
     10
20   580 PRINT#1,"B-P:"3;L
0C   590 PRINT#3,CHR$(B);
CD   600 GOTO 570
73   610 PRINT#1,"U2:"3;0;ASC(X$)
     ;ASC(Y$)
FE   620 PRINT#1,"U1:"3;0;ASC(T$)
     ;ASC(S$)
DE   630 X$=T$:Y$=S$
F8   640 PRINT#1,"B-P:"3;0
44   650 GET#3,T$,S$:S$=S$+CHR$(0
     ):
FE   660 READ L,B:IF L=255 THEN 7
     00
B6   670 PRINT#1,"B-P:"3;L
8E   680 PRINT#3,CHR$(B);
91   690 GOTO 660
BD   700 PRINT#1,"U2:"3;0;ASC(X$)
     ;ASC(Y$)
47   710 FOR Z=0 TO 6
5A   720 PRINT#1,"U1:"3;0;ASC(T$)
     ;ASC(S$)
22   730 X$=T$:Y$=S$
E4   740 PRINT#1,"B-P:"3;0
7A   750 GET#3,T$,S$:S$=S$+CHR$(0
     )
C2   760 NEXT Z
A1   770 READ L,B:IF L=255 THEN 8
     10
E3   780 PRINT#1,"B-P:"3;L
CB   790 PRINT#3,CHR$(B);
04   800 GOTO 770
8A   810 PRINT#1,"U2:"3;0;ASC(X$)
     ;ASC(Y$)
65   820 PRINT:PRINT TAB(5) "GEOD
     EX IS  NOW THE UK VERSION"
37   830 GOTO 960
D1   840 INPUT#1,A,B$:IF A THEN P
     RINT B$:STOP
DB   850 RETURN
F2   860 DATA 103,101,111,68,101,
     120,160,160
FE   870 DATA 133,16,144,2,230,17
     ,136,208:REM FIRST TRACER SE
     T
28   880 DATA 13,80,14,99,15,111,
     16,100,17,101,18,58,19,00,19
     2,69,193,00,202,136
69   890 DATA 203,00,206,140,207,
     00,208,177,209,00,216,79,217
     ,00,218,136,219,00
11   900 DATA 222,140,223,00,224,
     169,225,00,255,255
36   910 DATA 27,10,30,71,31,6,32
     ,83,33,16,34,78,35,8,38,103,
     39,10,42,87,43,15,255,0
7A   920 DATA 195,87,215,44,216,1
     30,217,128,218,54,219,2,220,
     130,222,71,224,130
C5   930 DATA 226,78,232,130,233,
     00,234,00,252,87,255,00
AB   940 DATA 11,71,15,78,19,103,
     255,00
DB   950 DATA 7,67,8,111,9,117,10
     ,110,11,116,12,121,255,00,00
     ,00
0F   960 PRINT TAB(4) "WOULD YOU
     LIKE ME TO BOOT GEOS?"
0B   970 CLOSE3:CLOSE1
9D   980 GET M$:IF M$=""THEN 980
01   990 IF M$<>"Y" THEN END
53   1000 LOAD"GEOS",8,1
```

EXTENDED BACKGROUNDS

PROGRAM: EXTENDED LOADER

```
1D   10 REM **** EXTENDED BACKGRO
     UNDS ****
D5   100 DATA76,7,192,76,53,192,0
     ,120,716
43   110 DATA169,76,162,192,141,2
     0,3,142,905
84   120 DATA21,3,169,50,141,18,2
     08,173,783
71   130 DATA17,208,41,127,141,17
     ,208,169,928
72   140 DATA129,141,25,208,169,2
     41,141,26,1080
91   150 DATA208,169,127,141,13,2
     20,169,255,1302
6D   160 DATA141,6,192,88,96,120,
     169,49,861
A4   170 DATA162,234,141,20,3,142
     ,21,3,726
A5   180 DATA169,0,141,26,208,169
     ,129,141,983
08   190 DATA13,220,88,96,169,129
     ,141,25,881
81   200 DATA208,238,6,192,174,6,
     192,224,1240
17   210 DATA25,176,18,189,64,3,1
     41,33,649
5A   220 DATA208,189,122,192,141,
     18,208,104,1182
3F   230 DATA168,104,170,104,64,1
     62,255,142,1169
A0   240 DATA6,192,169,50,141,18,
     208,76,860
D2   250 DATA49,234,58,66,74,82,9
     0,98,751
60   260 DATA106,114,122,130,138,
     146,154,162,1072
39   270 DATA170,178,186,194,202,
     210,218,226,1584
3E   280 DATA234,242,250,255,255,
     255,255,251,1997
D9   290 L=100:FORI=49152TO49303S
     TEP8
4D   300 ZZ=0:FORJ=0TO7:READZ:ZZ=
     ZZ+Z:POKEI+J,Z:NEXTJ:READZ
6B   310 IFZ<>ZZTHENPRINT"DATA ER
     ROR IN LINE"L:END
DB   320 L=L+10:NEXTI:END
```

PROGRAM: EXTENDED DEMO

```
82   100 REM SET INITIAL BACKGROU
     ND COLOURS
E4   110 FORI=0TO24:READJ:POKE832
     +I,J:NEXT
5F   120 SYS49152:REM ENABLE ROUT
     INE
4A   130 POKE53280,0:REM SET BORD
     ER COLOUR
24   140 PRINT"[CLR,DOWN,CYAN,SPC
     5]THIS IS A DEMONSTRATION SC
     REEN
BE   150 PRINT"[DOWN,PURPLE]  SHO
     WING HOW YOU CAN HAVE A DIFF
     ERENT
9C   160 PRINT"[DOWN,GREEN,SPC7]B
     ACKGROUND COLOUR FOR EACH
B5   170 PRINT"[DOWN,YELLOW,SPC6]
     CHARACTER LINE ON THE SCREEN
62   180 PRINT"[DOWN3,C1,SPC3]AS
     WELL AS A DIFFERENT FOREGROU
     ND
04   190 PRINT"[DOWN,C3,SPC3]COLO
     UR FOR EACH  CHARACTER SQUAR
     E
A4   200 PRINT"[DOWN3,SPC7,BLACK]
     W[WHITE]R[BLACK]I[WHITE]T[BL
     ACK]T[WHITE]E[BLACK]N[WHITE]
      [BLACK]B[WHITE]Y[BLACK] [WH
     ITE] [BLACK]P[WHITE]A[BLACK]
     U[WHITE]L[BLACK] [WHITE]W[BL
     ACK]I[WHITE]L[BLACK]L[WHITE]
     I[BLACK]A[WHITE]M[BLACK]S
7C   210 PRINT"[DOWN]
03   220 A$="[BLACK,C+,WHITE,C+,R
     ED,C+,CYAN,C+,PURPLE,C+,GREE
     N,C+,BLUE,C+,YELLOW,C+,C1,C+
     ,C2,C+,C3,C+,C4,C+,C5,C+,C6,
     C+,C7,C+,C8,C+]"
E9   230 PRINT"   "A$"[SPC3]"A$
AC   240 PRINT"   "A$"[SPC3]"A$"[Y
     ELLOW]";
E3   250 FORI=1TO5000:NEXT:REM PA
     USE
EA   260 C=0:FORI=1TO500:REM CYCL
     E COLOURS
F8   270 POKE832+RND(1)*25,C
85   280 C=C+1:IFC=16THENC=0
A1   290 NEXT
E6   300 SYS49155:REM DISABLE ROU
     TINE
A4   310 PRINT"[CLR]";:POKE53281,
     0:END
10   320 DATA6,6,2,2,13,13,5,5,5,
     9,9,9,11,11,11
4A   330 DATA11,8,8,8,12,11,12,11
     ,8,8
```



TRYING TO USE YOUR COMPUTER?...

YOUR
COMMODORE
CAN HELP.

12 issues UK £13.20
12 issues Europe £20.90
12 issues Middle East £21.20
12 issues Far East £24.00
12 issues Rest of World £21.60

Please begin my subscription(s) to YOUR COMMODORE with the .... issue.
I enclose my cheque/money order for £ .... made payable to Argus Specialist Publications Ltd.
or debit £.......... from my Access/Barclaycard No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
valid from .... to ....
NAME (Mr/Mrs/Miss) ....
ADDRESS ....
....
Postcode ....
Signature ....
Date ....

Please use BLOCK CAPITALS and include post codes

Send this form with your remittance to:
INFONET LTD., 5, River Park Estate, Berkhamsted, Herts HP4 1HL

YOUR
COMMODORE

Write your advert in BLOCK CAPITALS in the grid below, ticking the section you wish it to appear under, INCLUDING YOUR NAME AND ADDRESS IN THE WORD COUNT and send it to: **YOUR COMMODORE, ADVERTISEMENT DEPARTMENT, NO: 1 GOLDEN SQUARE, LONDON W1R 3AB.**
Lineage 54p per word (inc. VAT). Minimum charge £8.10. Display box rate £10.20 per single column centimetre + VAT. Minimum size 2.5cm, no reimbursements for cancellations. All ads must be pre-paid.

☐ **For Sale** ☐ **Software** ☐ **Hardware** ☐ **Languages** ☐ **Services** ☐ **Amiga**

CLASSIFIED COUPON

ALL CLASSIFIED ADVERTISEMENTS MUST BE PRE-PAID. THERE ARE NO REIMBURSEMENTS FOR CANCELLATIONS.

I enclose my Cheque/Postal Order* for £.......... for.......... insertions, made payable to Argus Specialist Publications.
(*Delete as necessary) or

PLEASE DEBIT MY ACCESS/BARCLAYCARD NO. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Expiry Date ....

£.............. for....... insertions

Name ....
Address ....
....
.... Post Code ....
Day-time Telephone No: ....
Signature .... Date ....

YOUR COMMODORE

Lineage: 54p per word. (including VAT)
Semi display: £11.73 per single column centimetre (including VAT) minimum 2cm. Ring for information on series bookings/discounts.

All advertisements in this section must be prepaid.
Advertisements are accepted subject to the terms and conditions printed on the advertisement rate card (available on request).

01-437 0699

Send your requirements to:
ALAN COLE
ASP LTD, 1 GOLDEN SQUARE, LONDON W1

FOR SALE

NEOS?
YOU NEED THE MOUSE PLUS

Enables you to use the mouse and keyboards together. Can be left connected all the time - includes a disc containing the mouse menue, Amiga style pull down menus while you programme. Two mouse drivers for your own programmes and D cheese mod. Full manual supplied. Let your C64/128 use the whole power of the mouse.
Does not damage the keyboard.

Send £19.95 to:
or phone for more details
Shazaan Systems
8 Alma Close, Knap Hill, Woking, Surrey.
Tel: 04867 89098

SPECIAL OFFERS

C64 & +4 POWER SUPPLIES
In stock £17.50 inc. P&P.
Cheque/P.O. to:-
W.E.
High House
Preston-On-Wye,
Hereford,
HR2 9JU

COPY DEADLINES

FOR JUNE ISSUE MARCH 21ST

LANGUAGE

FORTH AND LISP FOR THE C64 AND C128
These languages are available as 16K ROM Cartridges.
S-forth £24.90 S-lisp £32.90

LETCHWORTH SOFTWARE
45 Swift Close, Letchworth, Herts
SG6 4LL Tel (0462) 675305

SPECIAL OFFERS

DISCOUNT SOFTWARE: Latest titles for CBM64/128 at 75% off R.R.P.: S.A.E. To: A.O.W. 104 Hollywell Road, Lincoln. LN5 9BY.

LOOK OUT FOR COMMODORE DISK USER.

BUSINESS OPPORTUNITIES

IDEAS, INVENTIONS Wanted. Call I.S.C. 01 434 1272 or write: Dept (ASP) 99 Regent St, London W1.

TERMS

CLASSIFIED ADVERTISING TERMS & CONDITIONS

Our terms for new advertisers (semi-display and lineage) are strictly pro-forma payments until satisfactory reference can be taken up (excluding recognised advertising agencies). Cheques and PO's should be crossed and made payable to:
ARGUS SPECIALIST PUBLICATIONS LTD.,
and send together with the advertisement to:
THE CLASSIFIED DEPT., L/H, NO: 1 GOLDEN SQUARE, LONDON, W1R 3AB.
There are no reimbursements for cancellations. Advertisements arriving too late for a particular issue will be inserted in the following issue unless accompanied by instructions to the contrary.
All advertising sales are subject to Government regulations concerning VAT. Advertisers are responsible for complying with the various legal requirements in force eg: The Trade Description Act, Sex Discrimination Act & The Business Advertisements (Disclosure) Order 1977.
FULL TERMS & CONDITIONS OF ADVERTISING AVAILABLE ON REQUEST.

SERVICES

COMMODORE DISK LIBRARY
Free membership. Wide selection. send 2 x 18p stamps for deatils.
To: Commodore Disk Library 23 Curzon St., Derby.

Ring 01-437 0626 for Advertising Details

SOFTWARE

YOUR COMMODORE SPECIALS
TECH DRAW 64 - A comprehensive technical illustration aid for C64 owners for both disk and tape. Commands available include LINE DRAW, RAYS, BOX, CIRCLE, ARC, ELLIPSE, FREEHAND, FILL, HATCH & TEXT. Wipe copy, move and rotate, save and load or print your drawing all for £8.95 tape or disk. Order Codes TD64T (tape) TD64D (disk)
Full details in Your Commodore July 1987.

SPEEDY ASSEMBLER
Your Commodore's very own Assembler, a 100% memory resident program for loading from tape or disk, featured in the Your Commodore Machine Code Series and now the Y.C. standard assembler only £9.95 Tape or Disk. Order Codes YSPASSD (disk) YSPASSR (tape)
Order from Your Commodore Readers Services at 9, Hall Road, Maylands Wood Estate, Hemel, Hempstead Herts HP2 7BH. Please make cheques payable to A.S.P. Ltd., or telephone your Access/Visa order on 0442 41221

SERVICES

IS YOUR 128 GROWING UP OR GROWING OLD?

Scratch Software Club offers everything you need, we have a software database of all 128 software, detailed info and progs for CP/M, new hardware and software.
If you are fedup of no support from Commodore or ICPUG for the 128 then write for more details:-
Brampton, Croome Road, Defford, Worcs. WR8 9AR.

HARDWARE

TAPE BACK-UP BOARDS
FOR CBM-64/128 & VIC 20

The **Mk.1. uses a second CBM type cassette deck to copy a program as it loads. Very easy to use.**
£8.95 inc. P&P
NEW IMPROVED Mk.2. has a built in speaker so you can hear your copy being made. Works like the Mk.1. or can be switched to use our 'GENERATOR' software method.
£14.00 inc. P&P
ROM/SWITCH RESET BOARD resets ALL programs that a standard switch can't. Also has a socket for an 8K Eprom. Full instructions supplied.
£8.00 inc. P&P

All products guaranteed for 12 months

Send your cheque/P.O. or stamp for details to:- **TURBOTRONIC,**
46, Rippon Street, Parkinson Lane, HALIFAX, West Yorkshire, HX1 3UG.
Tel. (0422) 52020.

JOIN THE TEAM ADVERTISE IN THIS SPACE!

Repairs Guide

CALL

ALAN COLE

ON

01 — 437 0699

PROBLEMS WITH YOUR COMMODORE ?

FOR FAST, RELIABLE AND PROFESSIONAL REPAIRS AT COMPETITIVE PRICES

P M ENGINEERING

UNIT 8, NEW ROAD, ST. IVES,
CAMBRIDGESHIRE. PE17 - 4BG

VISA

ST. IVES (0480) 61394

FAST COMPUTER REPAIR CENTRE IN LONDON

★ Commodore range of Computers
★ Atari Computers (520 & 1040 ONLY)
★ All Amstrad range of Computers
★ Sinclair Spectrum
★ Sinclair Spectrum +
★ PHONE 01-863 7166

PROMPT ELECTRONICS
Unit 4, 15 Springfield Road, harrow, middx. HA1 1QF
(Entrance in Amersham Road behind Flower Shop)

COMMODORE SPARES AND REPAIRS

906114-01	£9.50
6510	£10.25
6526 CIA	£9.95
6581 SID	£11.45
901227-03	£8.95
901226-01	£10.95
901225-01	£8.75
8501	£8.50

INCL. VAT & P&P

OASIS

Dept. YC, 14 RIDGEWAY ROAD, SALISBURY, WILTSHIRE, SP1 3BU
TELEPHONE (0722) 335061

COMMODORE REPAIRS

By Engineers With 12 Years Experience on Commodore Equipment.

Commodore 64	From £26.00
Commodore C16, +4	From £24.00
Commodore 128/128D	From £35.00
Drives 1540/1541	From £25.00
Drives 1570/71	From £30.00
Amiga's	POA
Pets 3032-8096	POA
D/Drives 4040-8250	POA

For more details S.A.E. or phone Mon-Fri 9am-6pm

G.C. BUNCE & SON
36, BURLINGTON ROAD, BURNHAM, BUCKS. SL1 7BQ
Telephone (06286) 61696.

COMPUTER REPAIRS

SPECTRUM, COMMODORE, AMSTRAD, ACORN, BBC etc.

Fixed charge repairs on all makes

Please ring for details:

MCE SERVICES

33 Albert Street, Mansfield, Notts NG18 1EA
Tel: 0623 653512

G-TEK

SPECIALIST COMMODORE HOME COMPUTER REPAIRS

Commodore 64	£20.00	Commodore 128	£30.00
Commodore 16	£18.00	801/1526/802 printers	P.O.A.
Commodore +4	£18.00	Commodore Modem	£14.00
1541 Disk Drives	£22.00	Commodore SX Executive	£50

All repairs include a four month warranty. Repairs carried out by Ex. Commodore technicians. Spares also available for the above computers/peripherals on request.

Please enclose cheque/Postal order with repair made payable to **G-TEK.**

G-TEK, UNIT G, LAMMAS COURTYARD, WELDON INDUSTRIAL ESTATE, CORBY, NORTHANTS, NN17 1EZ.
Tel. (0536 69454) day or evenings Tel. (0536 203179) till 8pm.

CROYDON COMPUTER CENTRE

29 Brigstock Road, Thornton Heath, Surrey, CR4 7JJ Tel: 01 683 2646

COMPUTER SERVICING

(Est'd since 1979)

We repair — on the premises — quick turnround

★ Commodore & Spectrum
★ BBC & Electron (Approved Service Centre)
★ Amstrad & Torch (Approved Service Centre)
★ Disc Drives, Printers, Monitors

Mail Orders by phone Access & Visa accepted

COMMODORE REPAIRS

(with FREE extended guarantee)

COMMODORE 64	26.70
COMMODORE C16/+4	19.70
VIC 20	18.70
D/DRIVES, PRINTERS etc	POA

Price is all inclusive and we guarantee the whole computer for six months.

KPR MICRO, DEPT. YC

34, Petunia Crescent, Springfield, Chelmsford, Essex CM1 5YP
Tel. 0245 - 468554

COMMODORE REPAIRS

We specialise in repairs of Commodore Computers and Peripherals and many others.

★ FAST TURNROUND ★
★★ 3 MONTHS WARRANTY ★★
ALL INCLUSIVE PRICES START FROM £15

For a fast, reliable and professional service, send your Computer together with fault description to: **COMPUTER FACTORY, ANALYTICAL ENGINEERING LTD., ANALYTIC HOUSE, UNIT 18A, GRAINGER ROAD IND. EST., SOUTHEND-ON-SEA, ESSEX SS2 5DD**

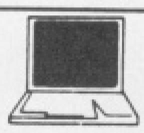
Phone (0702) 618455 for further information.

★★ 24hr answering service. ★★
★★ Software also available. ★★

COMPUTER REPAIRS

Fixed Super Low Prices!

Inclusive of parts, labour and VAT



FIRST AID FOR TECHNOLOGY

1 week turnaround Collection/delivery available for local area

★ SUPER OFFERS ★

SPECTRUM	£14 inc. + Free Game	ELECTRON	£19 inc.
C64	£22 inc. + Free Game	AMSTRAD 464	£32 inc.
C16	£18 inc.		+ Free Game
VIC20, C+4	£22 inc.	SPECTRUM 128	£16 inc.
BBC	£32 inc.	C64 P.S.U. for sale	£20 inc.

Please enclose payment with item - 3 month warranty on repair. Please enclose advert with repair

W.T.S. ELECTRONICS

5-9 Portland Road, Luton, Beds LU4 8AT. Tel: 0582 458375. Telex: 265871

OFFER YOUR REPAIR SERVICE TO THE YOUR COMMODORE READERS.

BREAK

Bug Finder

We'd like to remind our readers that we run a Bug Finder service.

If you have typed in one of our programs and despite much checking, you still can't get it to run, then send us the following:

Two copies of your program on tape or disk.
A description of your problem.
If possible a listing of your work (you may omit this).
A stamped, self-addressed envelope for return of the program to you.

Should any of the above be missing then we will not be able to deal with your query.

We will try to point out where you have made errors and place a corrected copy of the program back on to your tape or disk before we return it to you.

Do not send a program to us as soon as it stops working, please check it several times first.

We do get a large number of queries and so it may take a while for us to deal with yours personally.

Note: we can only deal with problems relating to programs published in *Your Commodore*.

Program Submissions

Due to the illness of our software evaluator some people may be experiencing a delay in getting to replies regarding submissions. We are trying to clear the backlog of programs as quickly as we can but this is taking some time. This backlog also effects Bug Finders and Lifesavers.

We apologise for the delay and would ask that you would bear with us while the backlog is cleared.

The publication of lifesavers has also been halted because of this software backlog. We will be bringing you more short programs and tips as soon as we can.

Commodore Where Are You?

At the *Your Commodore* office we are repeatedly asked for the address and telephone number of Commodore U.K. Many people, after referring to their computer manuals, believe them to be based in Corby.

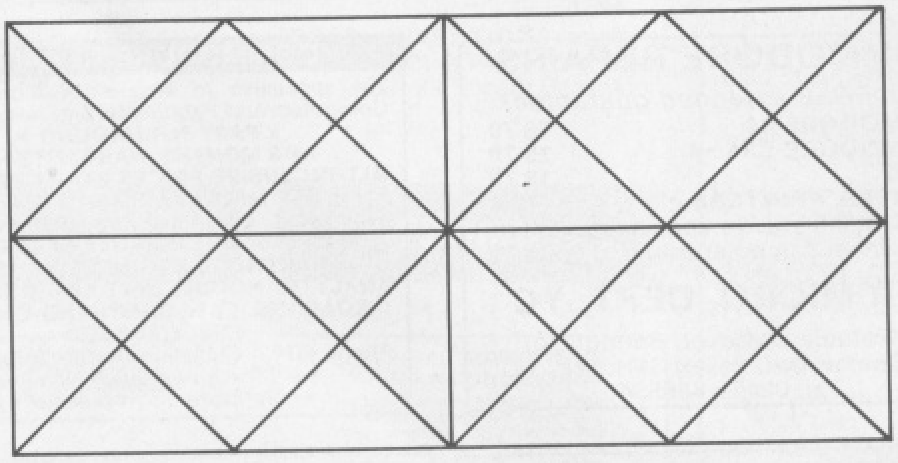
The Commodore plant at Corby was closed down some time ago. Reproduced here you will find the correct address for Commodore U.K.

We suggest that you write this correct address in the front of your computers manual for future reference.

Commodore Business Machine, (UK),
Commodore House,
The Switchback,
Gardner Road,
Maidenhead,
Berks SL6 7XA.

At the *Your Commodore* office we receive hundreds of letters from readers every month. We do try and answer each individually but sometimes this is impossible due to pressure of work. If you have written to us and not received a personal reply, we apologise for this but we cannot promise to reply to every item of mail we receive. If you feel that your question or letter really needs an answer, then inclusion of an s.a.e. will guarantee a reply, although this may still take time to arrive.

Puzzle Corner



Now's your chance to put your computer down for a while and give your brain some exercise.

Presented here are a series of puzzles for you to complete.

Send your answers to the *Your Commodore* Editorial address and you stand a chance of winning either a *Your Commodore* magazine binder or a *Your Commodore* disk binder.

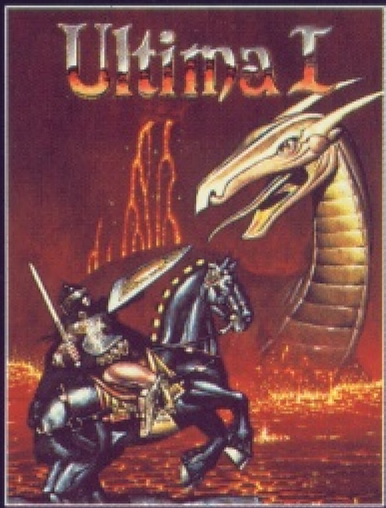
The first correct entry to each puzzle drawn out of the hat on Friday 29th April 1988 will win the binder of their choice, please state your preference when entering the competition. Entries should be sent to:
Your Commodore, Puzzle Corner, 1 Golden Square, London W1R 3AB.

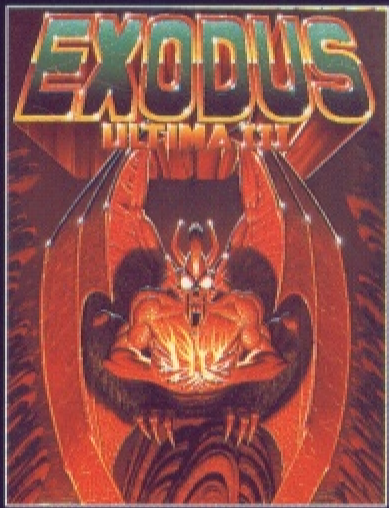
1. Your mother has just baked a delicious fruit cake. Can you cut it into eight pieces with just three cuts?
2. How many triangles are there in the diagram?
3. Our ace adventurer, Grontol the Mad is well known for being one of the greediest people around. How many sticky buns do you think he can eat on an empty stomach?
4. A *Your Commodore* reader has a nice little earner going selling eggs. One Friday, he sets off for market but *en route*, he is stopped by six different people. Each person buys half his eggs plus half an egg. At this stage as he only has one egg left, he turns round and goes home. How many eggs did he start off with?

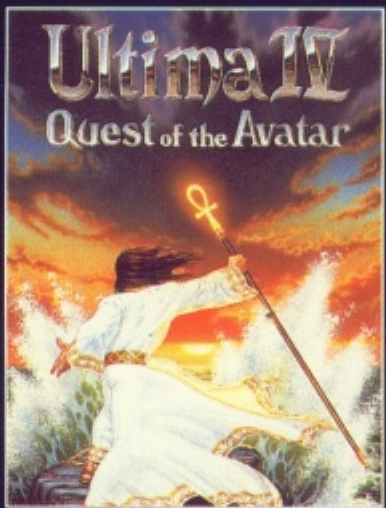
ORIGIN SYSTEMS INC.

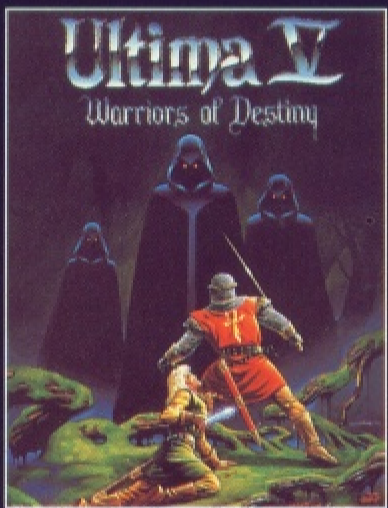
THE START OF SOMETHING NEW

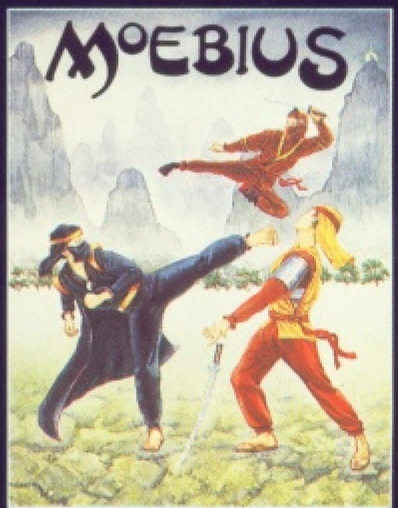
ULTIMA I: CBM 64/128 £19.95; IBM, APPLE £24.95. ULTIMA III: CBM 64/128, ATARI XE/XL £19.95; MAC, IBM, APPLE, ATARI ST, AMIGA £24.95. ULTIMA IV: CBM 64/128, ATARI XE/XL £19.95; IBM, APPLE, ATARI ST, AMIGA £24.95. ULTIMA V CBM 64/128 £19.95; APPLE £24.95.



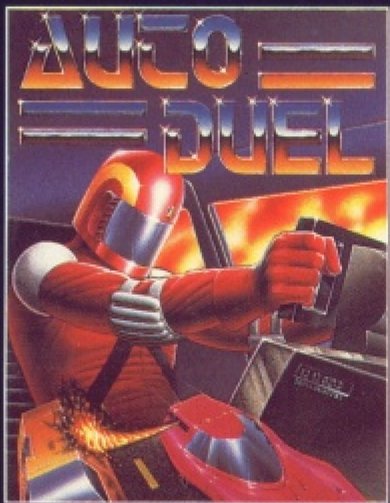


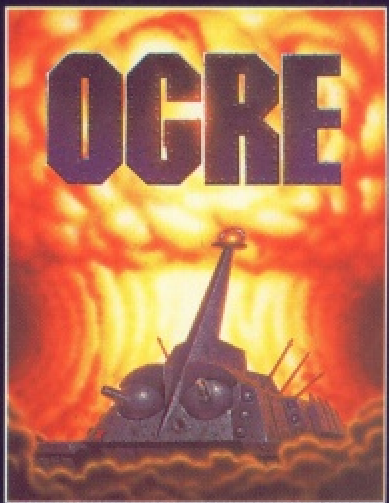






OGRE IS AVAILABLE FOR: COMMODORE 64/128. ATARI XE/XL DISK £19.95. IBM, APPLE, ATARI ST, AMIGA





AND MAC DISK £24.95.

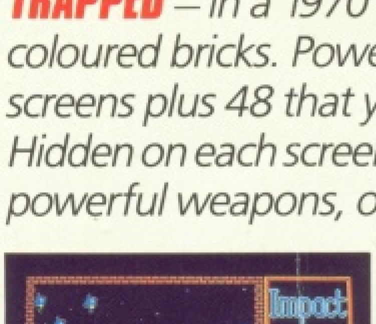
AUTODUEL IS AVAILABLE FOR COMMODORE 64/128 ATARI XE/XL DISK £19.95. APPLE, ATARI ST DISK £24.95

MicroProse Ltd., 2 Market Place, Tetbury, Gloucestershire GL8 8DA. UK. Tel: (0666) 54326. Tlx: 43422 MPS/UKG.

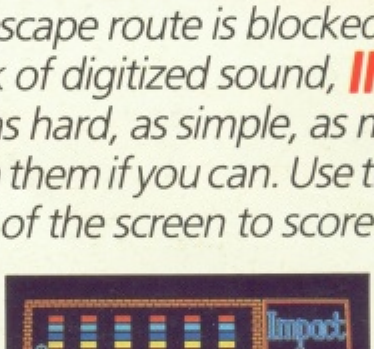


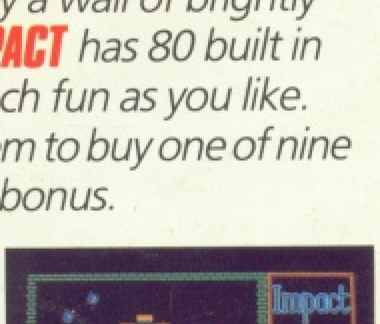
It plays like a dream... but seems like a NIGHTMARE!

TRAPPED – *in a 1970's arcade machine! Every escape route is blocked by a wall of brightly coloured bricks. Powerfully addictive, with 200k of digitized sound,* **IMPACT** *has 80 built in screens plus 48 that you can design yourself – as hard, as simple, as much fun as you like. Hidden on each screen are special tokens – catch them if you can. Use them to buy one of nine powerful weapons, or keep them until the end of the screen to score a bonus.*









Available now, price £14.95 for Amiga (512k min.) and Atari ST (requires 512k, mouse and colour monitor or TV).
Now released for CBM64, Spectrum and BBC (specifications vary).
Audiogenic Software ltd., Winchester House, Canning Road, Wealdstone, Harrow, Middlesex HA3 7SJ.

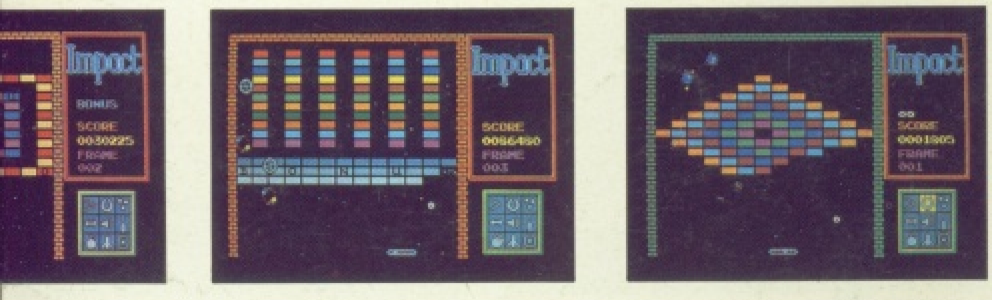
Tel: 01-861 1166

ASL



It plays like a dream...
...eems like a NIGHTMARE!

...nine! Every escape route is blocked by a wall of brightly
...e, with 200k of digitized sound, IMPACT has 80 built in
...n yourself – as hard, as simple, as much fun as you like.
...okens – catch them if you can. Use them to buy one of nine
...until the end of the screen to score a bonus.



...2k min.) and Atari ST (requires 512k, mouse and colour monitor or TV).
...BBC (specifications vary).
...se, Canning Road, Wealdstone,

Tel: 01-861 1166

ASL

Your Commodore April 1988

Volume 4 Number 7

YOUR

COMM...

APRIL 1988



Will this be the FINAL CARTRIDGE?

Sonus MIDI Products Reviewed

CP/M Assembly

UNBEATABLE PROGRAMS:

- Gyrospeed
- Making GEOS British
- Auto-Start
- Tabulate Text
- Extended Backgrounds

Latest Games Reviewed: Pla...